9 May 2014

Daniel Sullivan
Senior Environmental Scientist
Hansen Bailey
6/127-129 John Street
Singleton, NSW 2330

Cumberland Ecology
PO Box 2474
Carlingford Court 2118
NSW Australia
Telephone (02) 9868 1933
Mobile 0425 333 466
Facsimile (02) 9868 1977
Email: david@cumberlandecology.com.au

DRAYTON SOUTH COAL PROJECT - PROPOSED REVISED BIODIVERSITY OFFSET STRATEGY

Dear Daniel,

Cumberland Ecology has been requested to review and revise the proposed Drayton South Coal Project (the Project) Biodiversity Offset Package (BOP) that was exhibited in the Environmental Assessment (EA) for the Project. We understand that the need to review the current proposed BOP was precipitated by changes made to the Project mine plan in response to a NSW Planning Assessment Commission (PAC) Independent Review that was released late last year.

As a result of the findings of the PAC Independent Review, the NSW Department of Planning and Infrastructure (DP&I) instructed that the development footprint for the Project mine plan be reduced to address concerns raised by the PAC. Significant retractions of the mine plan were made and the resultant revised mine plan ('Proposed Revised Mining Areas Figure A', February 2014) now has the following components removed from the development footprint:

- The entire Houston Pit and associated overburden emplacement areas;
- The Houston Visual Bund;
- The south eastern extent of the Whynot Pit and the associated overburden emplacement area;
- A small section of the treated haul road to the east of the Whynot Pit; and
- The southern extent of the Redbank Pit.

The revised mine plan represents an overall reduction of the mine footprint for the Project by over 300 hectares (ha) when compared to the impact values presented in the original EA.

An analysis of the proposed retracted mine plan has since been carried out to assess its consistency with the proposed BOP that was exhibited in the Project EA as part of the Consequential Environmental Impact Assessment for Retracted Mine Plan (Hansen Bailey, March 2014). This analysis found that the removal of the Houston and Whynot Pits would allow for the retention of the majority of the on-site occurrence of the Commonwealth listed Critically Endangered Ecological Community (CEEC) and State listed Endangered Ecological Community (EEC) Box-Gum Woodland.

Given the significant reduction in impacts that would occur to Box-Gum Woodland as a result of the revised mine plan, it became apparent that a review and revision of the proposed BOP is needed to ensure that it remains commensurate with the impacts of the Project.

The purpose of this letter is to formally present a revised Project BOP that considers the retractions in the proposed revised mine plan. This letter also reviews and consolidates all commitments and strategies that have been made in response to regulator submissions since the exhibition of the EA to mitigate threatened species and ecological community impacts in the Project Boundary. The revised BOP is presented in **Appendix A** and is structured as follows:

- Brief introduction of the Project;
- Summary of the predicted impacts under the retracted mine plan;
- Description of the revised BOP and activities undertaken as part of the BOP; and
- Other measures intended to mitigate biodiversity impacts.

The revised BOP is expected to maintain the commitments made to mitigate and offset the biodiversity impacts of the Project. Although the quantum of offset land proposed to be included in the revised BOP has been reduced, the offset ratios have been maintained for native vegetation and threatened species habitat and have significantly improved for Box-Gum Woodland CEEC.

Yours sincerely,

Cecilia Phu
Senior Project Manager/Ecologist
cecilia.phu@cumberlandecology.com.au

Appendix A

Revised Drayton South Biodiversity Offset Package

A.1 Background

Drayton Mine is managed by Anglo Coal (Drayton Management) Pty Ltd which is owned by Anglo American. Drayton Mine commenced production in 1983 and currently holds Project Approval 06_0202 (dated 1 February 2008) which expires in 2017. Current operations are scheduled to cease in 2015 at which time the operation will have to close.

Anglo American is seeking Project Approval under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) for the Drayton South Coal Project (the Project). The Project will allow for the continuation of mining at Drayton Mine by the development of open cut and highwall mining operations within the Drayton South mining area while continuing to utilise the existing infrastructure and equipment from Drayton Mine. The Project will extend the life of Drayton Mine ensuring the continuity of employment for its workforce, the ongoing utilisation of its infrastructure and the orderly rehabilitation of Drayton Mine's completed mining areas.

An Environmental Assessment (EA) was prepared for the Project and submitted to the NSW Department of Planning and Infrastructure (DP&I) in December 2012. Within the EA, a series of mitigation measures and a Biodiversity Offset Package (BOP) were proposed to ameliorate and compensate for the predicted impacts on biodiversity values within the Project Boundary.

The Project has since been publicly exhibited and subjected to a Planning Assessment Commission (PAC) hearing and review. The PAC conducted an Independent Review of the Project and released their Independent Review Report in December 2013.

A.1.1 Retracted Mine Plan

Subsequent to the EA and as part of the extensive assessment process, further retractions were made to the Project mine plan in consultation with department agencies ('Proposed Revised Mining Areas Figure A', February 2014) and are shown in **Appendix B** of this letter. The retracted mine plan represents an overall reduction of the mine footprint for the Project by over 300 hectares (ha) when compared with the impact areas predicted in the EA.

An analysis of the proposed retracted mine plan has since been carried out to assess its consistency with the proposed BOP that was exhibited in the Project EA as part of the Consequential Environmental Impact Assessment for Retracted Mine Plan (Hansen Bailey, March 2014). This analysis found that the removal of the Houston and Whynot Pits would allow for the retention of the majority of the on-site occurrence of the Commonwealth listed Critically Endangered Ecological Community (CEEC) and State listed Endangered Ecological Community (EEC) Box-Gum Woodland.

Given the significant reduction in impacts that would occur to Box-Gum Woodland as a result of the retracted mine plan, it became apparent that a review and revision of the proposed BOP is needed to ensure that it remains commensurate with the impacts of the Project.

A brief summary of the predicted direct impacts of the retracted mine plan on threatened species, populations and ecological communities is provided below to provide context for the proposed revised BOP.

A.2 Predicted Impacts of the Retracted Mine Plan

A.2.1 Vegetation Communities

The retracted mine plan has a total disturbance footprint of 1,618 ha, which represents approximately 35% of the Study Area assessed for the Project (**Table 1**). The disturbance footprint will involve the direct clearance of a number of vegetation communities; this includes clearance of the following threatened ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- Central Hunter Box – Ironbark Woodland (EEC – TSC Act);
- Hunter Floodplain Red Gum Woodland and Derived Native Grassland (EEC – TSC Act and CEEC – EPBC Act);
- Narrabeen Footslopes Slaty Box Woodland (EEC – TSC Act); and
- Upper Hunter White Box-Ironbark Grassy Woodland and Derived Native Grassland (EEC – TSC Act and CEEC – EPBC Act).

Table 1 Revised Project Impacts on Vegetation Communities

Vegetation Community	Status		Retracted Mine Plan from PAC Review (ha)		
	TSC Act	EPBC Act	Study Area*	Disturbance Footprint	Proportion to be Disturbed (%)
Central Hunter Bulloak Forest Regeneration	-	-	26	25	94%
Hunter Valley River Oak Forest	-	-	2	2	100%
Central Hunter Box-Ironbark Woodland	EEC	-	479	177	37%
Hunter Floodplain Red Gum Woodland	EEC	CEEC	40	11	28%
Narrabeen Footslopes Slaty Box Woodland	VEC	-	100	98	98%
Upper Hunter White Box-Ironbark Grassy Woodland	EEC	CEEC	94	2	2%
Cooba Scrub	-	-	65	9	13%
Planted Vegetation	-	-	9	0	0%
Derived Native Grassland - Hunter Floodplain Red Gum Woodland	EEC	CEEC	10	4	39%

Table 1 Revised Project Impacts on Vegetation Communities

Vegetation Community	Status		Retracted Mine Plan from PAC Review (ha)		
	TSC Act	EPBC Act	Study Area*	Disturbance Footprint	Proportion to be Disturbed (%)
Derived Native Grassland - Upper Hunter White Box-Ironbark Grassy Woodland	EEC	CEEC	159	3	2%
Other Grassland	-	-	3,643	1,288	35%
TOTAL			**4,627**	**1,618**	**35%**

**The Study Area includes the proposed Drayton South disturbance footprint, the transport corridor, the Edderton Road realignment and water pipelines to the Hunter River. The Study Area excludes the existing Drayton Mine, which has been previously assessed by Hansen Bailey (2007) as part of an ecology impact assessment for the Drayton Mine Extension EA.*

A.2.2 Threatened Flora Species

The following threatened flora species/populations have been recorded within the Study Area:

- *Acacia pendula* (Weeping Myall);
- *Diuris tricolor* (Pine Donkey Orchid);
- *Cymbidium canaliculatum* (Tiger Orchid); and
- *Eucalyptus camaldulensis* (River Red Gum).

Of the above, only *Acacia pendula*, *Diuris tricolor* and *Cymbidium canaliculatum* occur within the revised mine disturbance footprint and are likely to be directly impacted by the Project. These species are listed as Endangered Populations within the Muswellbrook local government area under the TSC Act. *Diuris tricolor* is also listed as a Vulnerable species under the TSC Act.

Two small stands of regenerating *Acacia pendula* have been recorded in grassland within the Study Area. The Project is expected to result in the direct removal of one of these small stands of *Acacia pendula*. The stand does not comprise the Weeping Myall Woodland that is listed under the EPBC Act.

A subpopulation of about 30 individuals of *Diuris tricolor* was recorded within grassy understorey habitat that will be removed by the Project. It is likely that more individuals are present.

A single Tiger Orchid was recorded within the in habitat that will be removed by the Project.

Note that *Bothriochloa biloba* was a Vulnerable species listed under the EPBC Act and was recorded within the revised mine disturbance footprint. It was assessed as part of the EA but has since been delisted from the EPBC Act and is now no longer a threatened species.

A.2.3 Threatened Fauna

The following threatened fauna were recorded within the Study Area. The Project will have a direct impact on foraging and roosting habitat for these species, which are predominantly represented by woodland and forest birds and bats.

Table 2 Threatened Fauna Species Recorded in the Study Area

Family	Scientific Name	Common Name	Legal Status		Study	
			TSC Act	EPBC Act	Ecotone (2000)	CE (2009, 2011)
BIRDS						
Apodidae	*Hirundapus caudacutus*	White-throated Needletail		Mi	X	
Accipitridae	*Circus assimilis*	Spotted Harrier	V			X
Accipitridae	*Hieraaetus morphinoides*	Little Eagle	V			X
Psittacidae	*Lathamus discolour*	Swift Parrot	E	E; Ma		X
Strigidae	*Ninox connivens*	Barking Owl	V		X	
Meropidae	*Merops ornatus*	Rainbow Bee-eater		Mi	X	X
Climacteridae	*Climacteris picumnus*	Brown Treecreeper	V			X
Acanthizidae	*Pyrrholaemus saggitatus*	Speckled Warbler	V		X	X
Meliphagidae	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V		X	
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)	V		X	X
Petroicidae	*Petroica boodang*	Scarlet Robin	V			X
Petroicidae	*Melanodryas cucullata*	Hooded Robin	V		X	
Estrildidae	*Stagonopleura guttata*	Diamond Firetail	V		X	X
BATS						
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V			X
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V		X	X
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V		X
Vespertilionidae	*Miniopterus orianae oceanensis*	Eastern Bentwing-bat	V		X	X
Vespertilionidae	*Myotis macropus*	Southern Myotis	V		X	?

Table 2 Threatened Fauna Species Recorded in the Study Area

Family	Scientific Name	Common Name	Legal Status		Study	
			TSC Act	EPBC Act	Ecotone (2000)	CE (2009, 2011)
Vespertilionidae	*Nyctophilus corbeni*	Greater Long-eared Bat	V	V	X	
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V		X	
Vespertilionidae	*Vespadelus troughtoni*	Eastern Cave Bat	V			?

Key: V = Vulnerable; E = Endangered; Mi = Migratory; Ma = Marine; ? = call not positively identified

A.3 Revised Biodiversity Offset Package

In recognition of the unavoidable impacts of the Project, a comprehensive BOP has been developed to offset the residual ecological impacts that would remain after avoidance and mitigation measures have been implemented. The revised BOP features a reduction in the mine rehabilitation and offsite offset components compared to the proposed BOP presented in the EA but is still able to maintain a "no net loss" of biodiversity values; it also provides for the improvement of biodiversity values over the life of the Project.

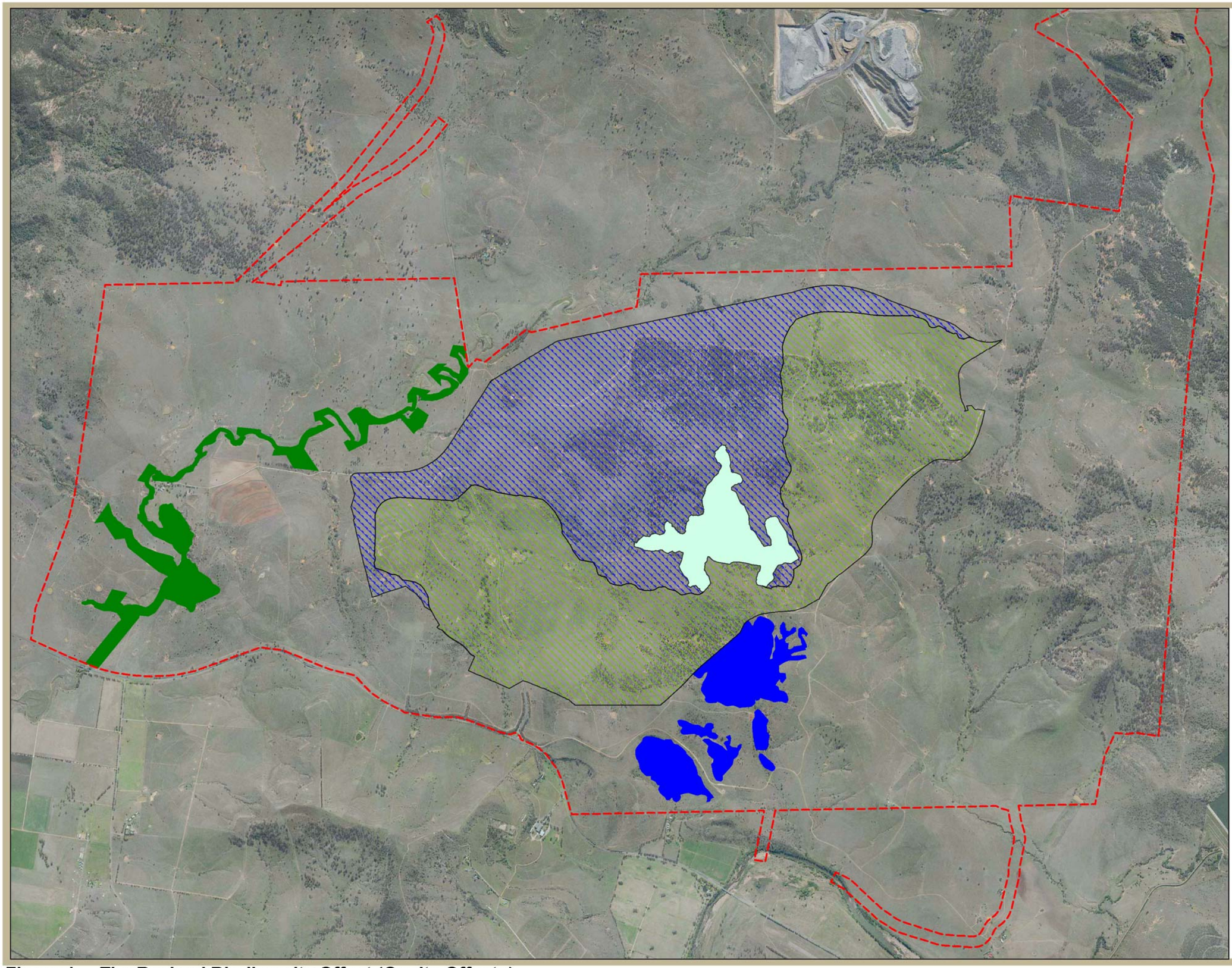
A.3.1 Components of the Revised BOP

The revised BOP includes the following components:

- Onsite Offsets, which is the protection and improvement of conservation areas within the Study Area:
  - Conservation of vegetation along the primary ridgeline in the Study Area;
  - The restoration and enhancement of Saddlers Creek and the wildlife corridor;
  - Rehabilitation of the Drayton South Disturbance Footprint; and
- Offsite Offset, which is the acquisition, long-term protection and improvement of an area of land located outside of the Study Area.

The onsite offsets have been developed to maximise the opportunities for conservation *in situ* and will address a significant proportion of the Project's offsetting commitments. Notwithstanding this, the onsite offsets will not meet all of the Project's requirements and additional offsets offsite are necessary to ensure that the Project will not result in a net loss in biodiversity. **Figure 1** shows the revised onsite offset components and and **Figure 2** shows the offsite offset component.

Coordinate System: GDA 94 MGA 56J



LEGEND

Project Boundary

Final Void

Onsite Offset Areas

Saddlers Creek Restoration

Conservation of Existing Vegetation along the Primary Ridgeline

Mine Rehabilitation: Central Hunter Box-Ironbark Woodland

Mine Rehabilitation: Narrabeen Footslopes Slaty Box Woodland

Grid North

Image Source: AAMC 2012

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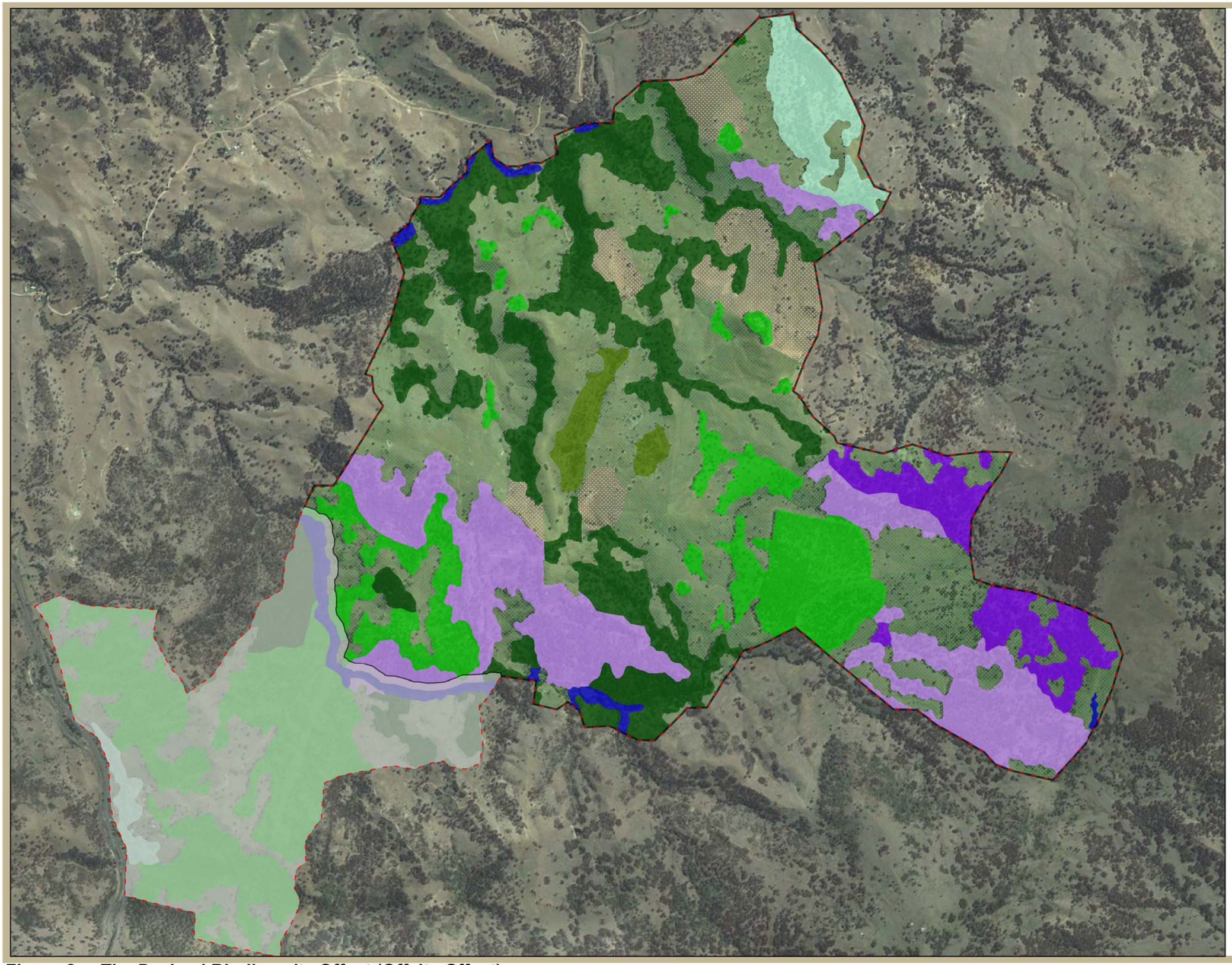
Figure 1 The Revised Biodiversity Offset (Onsite Offsets)

500 0 500 1000 1500 2000 m

Coordinate System: GDA 94 MGA Zone 56



LEGEND

- Property Boundary
- Agricultural area
- Conservation area

Vegetation Communities

- River Oak riparian woodland, eastern NSW
- Box - gum grassy woodlands, Brigalow Belt South and Nandewar
- Silvertop Stringybark grassy open forests, eastern Nandewar and New England Tablelands
- Silvertop Stringybark - gum open forest on basalts of the Liverpool Range, Brigalow Belt South and Nandewar
- Rough-barked Apple - Blakely's Red Gum riparian grassy woodlands, Brigalow Belt South and Nandewar
- White Box - stringybark shrubby woodlands, Brigalow Belt South and Nandewar
- White Box grassy woodland, Brigalow Belt South and Nandewar
- Derived Native Grassland
- Low Diversity Derived Native Grassland

Grid North

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Figure 2 The Revised Biodiversity Offset (Offsite Offset)

500 0 500 1000 1500 2000 m

A.3.2 Minimum Offset Ratios

To achieve a "no net loss" outcome, the revised BOP aims to maintain minimum offset ratios as committed to in the EA. These minimum ratios are:

- 6:1 of offset to impact area for Box-Gum Woodland vegetation types; and
- 3:1 of offset to impact area for other vegetation types.

Under the proposed revised mine plan, the minimum offsetting that would be required are presented in **Table 3**. The minimum offset areas required as shown in **Table 3** are greatly reduced from the minimum requirements discussed in the EA because of the significant retractions in the mine plan.

When the revised BOP is compared against the revised Project impacts (**Table 4**), it is clear that the revised BOP can maintain favourable ratios for Box-Gum Woodland CEEC well in exceedance of the minimum 6:1 ratio that was targeted.

Table 3 Minimum Offset Areas Required under the Proposed Revised Mine Plan

Vegetation Community	Area in Disturbance Footprint (ha)	Ratio	Offsets Required (ha)
Central Hunter Bulloak Forest Regeneration	25	3:1	75
Hunter Valley River Oak Forest	2	3:1	6
Central Hunter Box-Ironbark Woodland	177	3:1	530
Hunter Floodplain Red Gum Woodland*	11	6:1	66
Narrabeen Footslopes Slaty Gum Woodland	98	3:1	294
Upper Hunter White Box-Ironbark Grassy Woodland*	2	6:1	12
Cooba Scrub	9	3:1	27
Planted Vegetation	0	N/A	N/A
Derived Native Grassland - Hunter Floodplain Red Gum Woodland*	4	6:1	24
Derived Native Grassland - Upper Hunter White Box-Ironbark Grassy Woodland*	3	6:1	18
Other Grassland	*1,288*	*N/A*	*N/A*
Minimum Total Offset Areas Required	**1,618**		**1,052**
Minimum TOTAL Box-Gum Woodland Required	**20**		**120**

**Conforms to Box-Gum Woodland*

Table 4 Summary of Areas in the BOP Compared with the Offset Requirements under the Proposed Revised Mine Plan

Vegetation Community	IMPACTS				BOP								
					Saddlers Ck Restoration (ha)		Ridgeline (ha)	Onsite Rehabilitation (ha)		Offsite Offset (ha)	[C] Total Offset (ha)	Difference (ha) [C]-[B]	Offset Ratio [C] : [A]
	Area of Vegetation within Study Area (ha)	[A] Area of Vegetation within Disturbance Footprint (ha)	Minimum Ratio	[B] Offsets Required (ha)	Existing Available Offsets	Restoration Offsets	Existing Available Offsets	Ratio	Available Offsets				
Box - gum grassy woodlands, Brigalow Belt South and Nandewar										53	53		
Hunter Floodplain Red Gum Woodland	40	11	6:1	66	20	62					82		
Rough-barked Apple - Blakely's Red Gum riparian grassy woodlands, Brigalow Belt South and Nandewar										25	25		
Silvertop Stringybark grassy open forests, eastern Nandewar and New England Tablelands										246	246		
Upper Hunter White Box-Ironbark Grassy Woodland	94	2	6:1	12									
White Box grassy woodland, Brigalow Belt South and Nandewar										172	172		
Box-Gum Woodland (CEEC, EPBC Act; EEC, TSC Act)	**134**	**13**	**6:1**	**78**	**20**	**62**				**496**	**578**	**500**	**44.5**
Derived grasslands, Brigalow Belt South and Nandewar										668	668		
Derived Native Grassland-Hunter Floodplain Red Gum Woodland	10	4	6:1	24									
Derived Native Grassland-Upper Hunter White Box-Ironbark Grassy Woodland	159	3	6:1	18									
Low Diversity Derived Native Grassland**										98	98		
Box-Gum Woodland Derived Native Grassland (CEEC, EPBC Act; EEC, TSC Act)	**169**	**7**	**6:1**	**42**						**766**	**766**	**724**	**108.4**
Central Hunter Box-Ironbark Woodland (EEC)	479	177	3:1	530	4		50	0.5:1	719		773		
Narrabeen Footslopes Slaty Gum Woodland (VEC)	100	98	3:1	294				0.5:1	600		600		
Other Threatened Woodland and Forest communities	**579**	**275**	**3:1**	**824**	**4**		**50**		**1319**		**1373**	**549**	**5.0**
Central Hunter Bulloak Forest Regeneration	26	25	3:1	75									
Cooba Scrub	65	9	3:1	27			35				35		
Hunter Valley River Oak Forest***	2	2	3:1	6									
River Oak riparian woodland, eastern NSW*										14	14		
Planted Vegetation	9		N/A	N/A	N/A	N/A	N/A		N/A	N/A		N/A	N/A
Silvertop Stringybark - gum open forest on basalts of the Liverpool Range, Brigalow Belt South and Nandewar										71	71		

Table 4 Summary of Areas in the BOP Compared with the Offset Requirements under the Proposed Revised Mine Plan

Vegetation Community	IMPACTS				BOP								
					Saddlers Ck Restoration (ha)		Ridgeline (ha)	Onsite Rehabilitation (ha)		Offsite Offset (ha)	[C] Total Offset (ha)	Difference (ha) [C]-[B]	Offset Ratio [C] : [A]
	Area of Vegetation within Study Area (ha)	[A] Area of Vegetation within Disturbance Footprint (ha)	Minimum Ratio	[B] Offsets Required (ha)	Existing Available Offsets	Restoration Offsets	Existing Available Offsets	Ratio	Available Offsets				
White Box - stringybark shrubby woodlands, Brigalow Belt South and Nandewar										296	296		
Other non-listed Forest and Woodland communities	**102**	**36**	**3:1**	**108**			**35**			**381**	**416**	**308**	**11.6**
Other Grassland	3643	1288	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A		
Other Grassland	**3643**	**1288**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
TOTAL All Vegetation (woody and grassy)	**4627**	**1618**		**1052**	**24**	**62**	**85**		**1319**	**1643**	**3133**	**2081**	**1.9**
TOTAL All Forest and Woodland (existing and future restoration)	**815**	**324**		**1010**	**24**	**62**	**85**		**1319**	**1643**	**3133**	**2123**	**9.7**
TOTAL All Forest and Woodland (existing areas)	**815**	**324**		**1010**	**24**	**0**	**85**		**0**	**877**	**986**	**-24**	**3.0**
TOTAL Box-Gum Woodland	**303**	**20**		**120**	**20**	**62**	**0**		**0**	**1262**	**1344**	**1224**	**67.0**

*Co-dominated by *Eucalyptus melliodora* or *Eucalyptus blakelyi* x *Eucalyptus teretecornis* but has not been included in Box Gum Woodland complex for the purposes of this Project

**Only listed under the TSC Act

***Equivalent vegetation in the offsite offset property is *River Oak riparian woodland, eastern NSW*

A.4 Activities within the Onsite Offsets

Anglo American is committed to meeting a significant portion of their offset requirements onsite through the restoration of Saddlers Creek, rehabilitation of the Project Disturbance Footprint and retention and protection of vegetation along the primary ridgeline of the Study Area to ensure that favourable biodiversity outcomes are achieved for the immediate region in which the Project is located. These are discussed in more detail below.

A.4.1 Restoration of Saddlers Creek

The restoration of Saddlers Creek will involve the retention and improvement of 20 ha of existing Hunter Floodplain Red Gum Woodland that is situated within the immediate vicinity of Saddlers Creek. In addition to this, there is an opportunity to restore an additional 62 ha of Hunter Floodplain Red Gum Woodland through the planting of native vegetation. This restoration work will be carried out in conjunction with the Hunter Catchment Management Authority, or the CMA). Various aspects of the proposed Saddlers Creek restoration program are discussed below.

i. Wildlife Corridor Values

Connectivity of new and existing offsets will be provided for in the long term through implementation of a connected system of corridors and habitat patches across the Project, and linkages to other wildlife reserves and areas of native habitat in the locality. Wildlife corridors connecting key areas of habitat increase the effective amount of habitat that is available for species and reduces the impacts of habitat fragmentation. This is especially important for migratory animals and those with large home ranges. Larger habitats support greater biodiversity, larger populations, and a wider range of food sources and shelter. Corridors also allow populations to interbreed, improving long-term genetic viability.

The key wildlife corridor being established by the Project is around Saddlers Creek, where the implementation of an intensive creek corridor restoration program will enhance its ability to act as a wildlife corridor. This strategy has been developed in consultation with the CMA and involves the rehabilitation of the lower reaches of Saddlers Creek to the west of Edderton Road and restoration of riparian vegetation and Box-Gum Woodland around the core creekline. This will improve the area and condition of existing vegetation communities such as Central Hunter Box-Ironbark Woodland and Hunter Floodplain Red Gum Woodland in this area.

ii. Improvement of Creekline Condition and Function

Due to extensive agricultural practices and erosion, natural recruitment of native plant species along Saddlers Creek is low, and continues to be suppressed by grazing cattle and feral animals. A wide, dense riparian zone comprised of local provenance species will be regenerated along the length of Saddlers Creek to provide habitat for native fauna and flora, stabilise the channel banks and link with already existing communities to form broader habitat corridors. To minimise erosion, the upper banks and flats of Saddlers Creek will be stabilised with rapid growing native groundcover. The exclusion of stock will be critical for the rehabilitation of vegetation around Saddlers Creek as cattle exacerbate soil erosion by direct

soil disturbance from their hooves, and by removing ground cover vegetation that stabilises the soil. Therefore fencing will be installed to exclude stock, but allow native animals to utilise the revegetated areas for forage and nesting habitat and as a movement corridor.

These efforts will collectively enhance the ecological function of Saddlers Creek by:

- Extending riparian communities along the extent of Saddlers Creek and its tributaries that lie within the Study Area. This will improve the habitat and water quality of Saddlers Creek and stabilise highly eroded creek banks;
- Establishing fully viable and self-sustaining ecological communities, such as Central Hunter Box-Ironbark Woodland and Hunter Floodplain Red Gum Woodland, in cleared agricultural areas within the corridor by excluding cattle, implementing assisted natural regeneration methods and supplementary planting from tube stock to create and/or increase structural complexity;
- Building on wildlife movement and offset corridors along Saddlers Creek by linking other parts of the catchment that are already being managed and restored for conservation within land owned by Mt Arthur Coal and Drayton Mine. Extending green corridors from these sites in the north, through the Study Area to the Hunter River in the south, will secure a substantial area of high quality habitat for native fauna that will be conserved in the long-term; and
- Reducing the extent of invasive weed species and feral animal abundance within the Saddlers Creek corridor to both remove pressures from regenerating species and improve native biodiversity in the locality.

Adjacent gullies and watercourses to Saddlers Creek that are within the Study Area will also be rehabilitated. There may be some potential to return the creeks to close to their natural condition by rehabilitating the incised channels and stabilising 'chains of ponds' where possible. Some sections of Saddlers Creek still show evidence of this morphology in deep, permanent pools separated by sediment, however most are lacking native vegetation to stabilise the channels and are subject to further degradation by cattle.

Actions to be taken in the restoration of Saddlers Creek and adjacent gullies include:

- Protecting existing ponds from damage by excluding livestock and fencing riparian areas;
- Densely vegetating the instream within Phragmites and other aquatic vegetation to trap sediment and prevent erosion;
- Creating pools and sediment bars by creating rock weirs;
- Soil conservation earthworks; and
- Reinstating snags and woody debris to provide habitat complexity for aquatic fauna.

Soil conservation earthworks are required in the proposed Saddlers Creek rehabilitation area to ensure the stability of soils and long term viability of the land. A number of soil conservation measures for Class IV to VII soils, as recommended by CMA, will be implemented including graded contour banks and contour ripping. Existing contour banks will be reshaped and extended, or removed if they are no longer functionally viable. Additional low gradient contour banks will be constructed across creek and tributary slopes with the aim of increasing the amount of water retained in the Saddlers Creek catchment. These banks will intercept and slow runoff, spread water across grassed floodplain areas, and will divert flows from degraded areas to minimise channel flow velocity and limit further gully and bank erosion. Graded banks can also help prevent contamination of the waterways by filtering and trapping sediment brought from overland flow, particularly from rills and old gully lines (Department of Environment and Resource Management, 2004).

To enhance the effectiveness of the contour banks, native groundcover plants and sterile exotics (e.g. Japanese Millet) will be sown between contour banks to reduce run off velocities of water and trap sediment and help reduce their maintenance costs (Department of Environment and Resource Management, 2004). Groundcover species will be locally endemic and suitable for the soil type.

iii. Augmentation of Adjacent Conservation Works

The restoration of the Saddlers Creek corridor and improving the condition of existing vegetation within the immediate vicinity is a valuable compensatory measure as it represents “like for like” or better as an outcome. Anglo American in association with the CMA, has established credentials for previous project work with *Eucalyptus camaldulensis* (River Red Gum) restoration along the Hunter River and Dart Brook at the Dartbrook Mine, and has the necessary expertise to conduct this work. Furthermore, there is potential to create a catchment-based offset, which is the CMA’s approach to land management. This will build on and complement existing offsets along Saddlers Creek managed by Mt Arthur Coal, and CMA works in other tributaries of Saddlers Creek. Mt Arthur Coal’s proposed Saddlers Creek Conservation Area is approximately 295 ha in size, and includes the main channel of Saddlers Creek, running along the southern and south eastern boundaries of the Mt Arthur Coal Boundary. By building on Mt Arthur Coal’s biodiversity offset areas, the Project will add value and help create a substantial conservation area in the locality that is of ecological significance as it contains:

- Known threatened species;
- Known regionally significant species;
- Presence of a substantial number of tree hollows;
- Known examples of the Tiger Orchid (*Cymbidium canaliculatum*) Endangered Population;
- Riparian corridor values along Saddlers Creek;
- Linkages to Drayton Mine’s southern offset area over the offsite portion of Saddlers Creek and proximity to Drayton Wildlife Refuge; and

- Remnants of threatened vegetation communities including:
  - White Box Derived Native Grassland;
  - Hunter Floodplain Red Gum Woodland; and
  - Central Hunter Box - Ironbark Woodland.

Furthermore, the restoration of Saddlers Creek will address the following Environmental Assessment Requirements (EAR):

> *"An offset strategy to ensure that the project maintains or improves the biodiversity values of the region in the medium to long term (in accordance with NSW and Commonwealth policies), paying particular attention to the existing Saddlers Creek Conservation Area and Mt Arthur Coal's biodiversity offset areas".*

iv. Case Study - Success of Anglo American's Dartbrook River Restoration Project

In 2005, a joint project between Anglo American and the CMA was established to improve the health of a 6.5 km section of the Hunter River and Dart Brook, both degraded watercourses in the region, at Dartbrook Mine north of Muswellbrook. The objectives of the 5 year project were various riverbank and stream bed rehabilitation and restoration works at 7 sites that aimed to:

- Protect and enhance a 12 ha area containing one of the largest remaining populations of River Red Gum (*Eucalyptus camaldulensis*), an endangered population in the Hunter Catchment;
- Promote natural regeneration within natural and artificial (through irrigation and bunds) flood areas in conjunction with the planting of 4000 seedlings amidst the remnant population, such that the River Red Gum community is self-sustaining;
- Increase native vegetation density and diversity;
- Provide habitat and a habitat corridor for native fauna, particularly birds, by planting dense patches of habitat species in all strata;
- Minimise further riparian and stream biodiversity loss;
- Manage introduced species and weed infestations;
- Prevent further bank instability and erosion by excluding stock and planting along the riparian corridor; and
- Improve channel bed stability, water quality and flow regimes, protect upstream Chain-of-Ponds streams and restore fish habitat (fish 'hotels') and native fish stocks through the strategic in-stream placement of large logs (with I&I (NSW) and CMA).

Ongoing management, including periodic inspections by the CMA and monitoring undertaken by external consultants using methodology determined with the CMA, has determined that these works are progressing well. Further rehabilitation and restoration works were allowed in 2011, subsequent to completion of the project in 2010, with the renewal of a Scientific Licence issued under Section 132C of the *National Parks and Wildlife Act 1974* (NP&W Act). As of the beginning of 2011, successfully completed activities included:

- River Red Gums that had naturally regenerated during a 2007 flooding event were found to be thriving within the constructed bunds;
- Tree growth such that tree guards could be removed;
- Strategic removal of Weeping Willows (*Salix* sp.) and the ongoing management of noxious weeds including African Boxthorn, Bathurst Burr and Green Cestrum;
- Trapping of feral pigs, undertaken in conjunction with Livestock Health and Pest Authority (LH&PA);
- Placement of fish hotels;
- Ongoing maintenance including weed and pest control, as well as infill planting in areas that have a low survival rate of seedlings.

Thus, Anglo American has a proven track record for creekline restoration works. The Saddlers Creek Restoration Project will be undertaken by Anglo American in conjunction with the CMA in a similar partnership as that at Dartbrook Mine and is expected to be effective and deliver on the conservation objectives outlined for the BOP.

A.4.2 Onsite Conservation of Vegetation

In addition to the rehabilitation of native vegetation along Saddlers Creek, existing vegetation along the primary ridgeline in the Study Area will be conserved, including Central Hunter Box-Ironbark Woodland (which is an EEC) and Cooba Scrub. These areas will have direct connectivity with adjacent revegetated communities established as part of the mine rehabilitation.

Areas of native vegetation that will be conserved in the Study Area will be managed for conservation including weed and feral animal control and other management actions as required for maintaining and enhancing their conservation value.

A.4.3 Rehabilitation and Revegetation of the Project Disturbance Footprint

The Project Disturbance Footprint will be progressively rehabilitated over the life of the Project. The principle objective of the mine site rehabilitation strategy will be to replace to the extent possible, through revegetation and rehabilitation strategies, the original native vegetation communities that will be lost within the Project Disturbance Footprint. This includes the recreation of Central Hunter Box-Ironbark Woodland and Narrabeen Footslopes Slaty Box Woodland, which constitutes a 0.5:1 ratio for the impacted communities in this area.

The mine site rehabilitation strategy will aim to recreate native vegetation that is self-sustaining in the long term and is capable of supporting a diverse range of viable flora and fauna populations. The mine site rehabilitation strategy will also contribute to maintaining a vegetated landscape in the Study Area in the long term that provides a "stepping stone" corridor between larger remnant patches of vegetation in the locality (DSE (VIC), 2008).

The importance of maintaining treed habitats in disturbed landscapes as corridors for fauna movement and seed dispersal is well-known (Cooper *et al.*, 2002; Fischer and Lindenmayer, 2002; DSE (VIC), 2008; Goldingay and Taylor, 2009). "Stepping stones" have been shown to be important in maintaining landscape connectivity and maintaining gene flow between separate populations because it facilitates the movement of pollen and seed vectors such as animals and insects (Lindenmayer and Fischer, 2006).

Rehabilitation trials of targeted vegetation communities have commenced at Drayton Mine to ensure efforts on the Drayton South disturbance footprint are successful.

It is acknowledged that there will be a substantial time lag before mine rehabilitation at Drayton South will mature and develop critical habitat features (e.g. hollows, ground debris, and flowering resources) that will provide sustained forage and shelter habitat for threatened species. Where possible, these processes will be artificially enhanced through the installation of nest boxes, salvaged timber and salvaged hollows in remnant vegetation to be retained in the Study Area and Drayton Wildlife Refuge. As rehabilitation progresses, salvaged timber and other habitat features will be emplaced in the rehabilitation areas to encourage the return of native fauna.

The Project will progressively clear vegetation in strips over the 20 year life of the Project. This means that areas of mature, remnant woodland will be maintained in the Project Disturbance Footprint for the majority of the life of the Project. Rehabilitation will also be implemented on a progressive basis behind the mining activities and will be undertaken as soon as these areas have achieved a stable final landform. By the end of life of the Project, the majority of the rehabilitation would have progressed significantly.

The retention of mature, remnant woodland on the primary ridgeline and enhancement of existing forest and woodland along Saddlers Creek (20 ha existing and 62 ha to be restored) will be retained and protected and so will continue to provide important forage and shelter habitat for locally occurring fauna while clearing and rehabilitation take place. Proximate conservation areas, including the Drayton Mine, Mt Arthur and Ravensworth conservation areas will also continue to provide areas of woodland that support resources for threatened species.

In the short to medium-term, the majority of the Study Area will remain vegetated. The rehabilitated vegetation will play an important role in maintaining habitat areas in the Study Area as the Project progresses.

A.4.4 Likely Success of Rehabilitation

The proposed vegetation conservation and rehabilitation measures have been designed to produce measurable biodiversity outcomes and are based on recognised principles of rehabilitation and land management (McIntyre *et al.*, 2002). Despite this, it is difficult to predict how long it will take a given rehabilitation area to regenerate into a fully functioning ecosystem, as this is dependent on many factors including disturbance history, proximity of nearby remnant vegetation, condition of the soil and the management regime implemented. There are few areas of mature rehabilitation in Australia, which means that there is little information currently available on the long-term ecological development of rehabilitated communities (Nichols, 2005; Nichols *et al.*, 2005). Due to the inherent variability of ecological systems, the ability to predict long-term successional trends in rehabilitation is low, and it is difficult to accurately predict the composition and structure of vegetation beyond 10 years (Nichols, 2005). Nevertheless, it is clear that ceasing agricultural activities and the implementation of appropriate management techniques such as weed control and supplementary planting have the potential to substantially increase biodiversity. Furthermore, rehabilitation of post-mining landscapes for biodiversity conservation (i.e. beyond the rehabilitation requirements under the *Mining Act 1992*) is important and is capable of delivering ecological benefits, such as maintaining a forest or woodland landscape in the Study Area and providing habitat for local flora and fauna populations that depend upon such habitats.

With this in mind, Anglo American has committed to carrying out mine rehabilitation within a conservation framework that will involve rehabilitation objectives, completion criteria, measurable indicators and rigorous monitoring aimed at biodiversity outcomes. Furthermore, Anglo American acknowledges that there is a level of risk associated with mine rehabilitation. In recent times a discount of 50% has been applied to mine rehabilitation used as a biodiversty offset for other mining projects in NSW. Therefore, only 50% of the total area of mine rehabilitation will contribute towards the BOP for the Project.

Anglo American is committed to carrying out rehabilitation consistent with best practice guidelines and to applying the most current knowledge to improve the performance of rehabilitation works. For instance, Anglo American commenced rehabilitation trials a year ago at Drayton Mine to investigate the effectiveness of various mine rehabilitation techniques. This investigation will be ongoing and is intended to inform the future mine rehabilitation practices at Drayton South to improve the likelihood of rehabilitation success.

The results of other available studies and the most current information will also be considered and applied throughout the life of the Project to improve the likelihood of rehabilitation success. For example, experimental revegetation studies of Kurri Sand Swamp Woodland and Central Hunter Box Ironbark Forest, conducted by Cole *et al* (2010) from the Centre for Sustainable Ecosystem Research at the University of Newcastle, reported high survival rates of seedlings under specific treatments.

Another example includes the Mt Owen Mine and Ravensworth State Forest Vegetation Complex (Cole, 2009). After fourteen years, substantial progress has been made;

> "*the forest remnants have shown significant natural regeneration after removal of grazing pressure and the 2007 flooding rains that have caused a pulse of regeneration likely to change forest structure. The New Forest has maturing upper middle and canopy species that are producing viable seed and in the offset areas plantings are becoming well established and even producing fruit. The understanding of the forest and associated remnant vegetation has led to the development of a restoration site both with considerable ecological value for the region and highly significant experimental outcomes*".

A.4.5 Restoration and Rehabilitation Guidelines

A number of guidelines are currently being proposed by DP&I and the NSW Office of Environment and Heritage (OEH) for the restoration of ecosystems of the Hunter Valley, including endangered ecological communities. Anglo American is committed to conducting all restoration works generally in accordance with any relevant guidelines that may be made available by DP&I and OEH. Such guidelines are likely to provide guidance on:

- Improving biodiversity outcomes for areas that have been mined where the mine approval completion criteria for rehabilitation requires the establishment of functioning ecosystems on the mine disturbance site, and ongoing management and monitoring;
- Achieving restoration and improved biodiversity outcomes for offset lands, including the following:
  - Land secured as offsets that may be within the mining lease that are not disturbed by mining activities; and
  - Land secured as an offset on privately owned land under a Biobanking Agreement, conservation covenant or another appropriate mechanism.

Restoration of forest and woodland to a structural complexity with diverse age classes comparable to the original community structure will take many decades, but natural regeneration will be achieved with supplemented revegetation in a manner consistent with the above guidelines. Furthermore, restoration efforts will generally aim to achieve other accepted revegetation criteria where relevant, such as the following descriptors for woodland (McIntyre *et al.*, 2002):

- Tree density of about 30 to 40 mature trees per hectare, which is accepted as being ecological optimal for woodland units;
- Minimum woodland patch sizes of at least 5 ha, which maintains patch viability; and
- Continuous groundcover of tussock grasses, forbs and woody debris, which are important in woodland and riparian corridors for soil stabilisation and attenuation of surface water flows.

Restoration and rehabilitation works will be staged in concurrence with clearing for the mine to minimise as much as possible the loss of habitat at any one time.

For restoration and management of the habitat values of the Study Area, the following measures will be implemented:

- Use of local provenance native shrubs, trees and groundcover plants to maintain genetic health of planting stock and optimise success of revegetation;
- Use of native shrubs, trees and groundcover plants that are characteristic of the vegetation proposed to be cleared to mitigate the loss of these species from the Study Area;
- The use of characteristic species also pertains to those species characteristic of Hunter Lowland Redgum Forest, which will be planted as part of the woodland rehabilitation effort at Drayton Mine to address the loss of 0.4 ha of regrowth Hunter Lowland Redgum Forest;
- Translocation of topsoil from the Project Disturbance Footprint to areas being rehabilitated/revegetated to conserve the native seed bank of local ecological communities;
- Inclusion of logs, dead trees and stumps in strategic locations to enhance fauna habitat;
- Incorporation of existing natural vegetation where possible;
- Provision of vegetative links to existing bushland remnants in the Study Area; and
- Management of weeds and feral animals.

A.5 Offsite Offset

The offsite offset comprises approximately 79% of a 2,079 ha grazing property situated in the undulating hills near the township of Murrurundi in the Liverpool Plains local government area. It is located approximately 75 km north of the Project Boundary within the southern extremity of Nandewar Bioregion, at its boundary with the Sydney Basin Bioregion. It is within the Liverpool Ranges close to the Pages River.

Although the offsite offset property does not adjoin a conservation reserve, several are located within the locality. The closest conservation area is the Murrurundi Pass National Park (215 ha), located approximately 900 m to the south of the property. Towarri National Park (6,074 ha) and Wingen Maid Nature Reserve (1,096 ha) are approximately 10 km and 14 km to the south respectively; and Wallabadah Nature Reserve (1,132 ha) is located approximately 13 km to the north east of the offsite offset property.

The property features relatively steep country that ranges from 500 to 900 metres in elevation and receives a high annual rainfall. The eastern half of the property occurs on soils derived from basalt whilst the western half occurs on soils derived from mudstone. The original woodland and forest vegetation on both the fertile basalt soils and the less fertile mudstone soils have been partially cleared or modified for livestock grazing, particularly sheep grazing.

Two semi-permanent creeks and their tributaries, Chilcotts Creek and Back Creek, flow through the property and contain water for the majority of the year. The property largely drains to the Namoi catchment, although a small proportion of the property is within the Hunter catchment. Dams have been established throughout the property to supply water for livestock.

The property is currently used for stock grazing (sheep and cattle) and some areas have been improved, producing a mixture of native and improved pastures. Nevertheless, the property is well vegetated and continues to support extensive areas of diverse remnant woodland and open forest with a natural or semi-natural understorey. Natural regeneration of a number of tree species is prolific across the property and regular ringbarking to provide grazing pasture for livestock is evident. Overall, the property has a very good potential for habitat improvement if it becomes managed for conservation rather than farming.

The property contains approximately 1,100 hectares of remnant forest and woodland that are dominated by a mixture of Box, Gum and Stringybark eucalypt species. The remainder of the property (approximately 900 hectares) consists of grassland areas. This vegetation provides large areas of habitat for fauna and support a natural or semi-natural understorey. The habitat values associated with mature remnant forest and woodland on the property include the provision of tree hollows, flowering food resources and shelter. In addition to this, the property contains frontage to Chilcotts and Back Creeks, the riparian vegetation associated with these creeklines and other permanent watering points such as farm dams. Large areas of native derived grassland dominated by large tussock grasses such as *Poa labillardieri* (Tussock Grass) also provide foraging habitat for ground-foraging fauna species. Nearby cliff lines and rock outcrops are also habitat attributes that add to value of the property for native fauna.

A.6 Security of the Offset Areas

The offset lands will be permanently protected by an appropriate mechanism. There are a number of options that are available to permanently protect land for conservation and these include:

- Conservation Agreements (CA), which are a joint agreement between landowners and the Minister for the Environment under the NP&W Act;
- Conservation convenants under Section 88 of the *Conveyancing Act 1919*; this is a joint agreement between the landowner and an authorised body;
- Application to change zoning regulation that dictates land use;
- Dedication of land to the National Parks reserve estates; and

- Land acquisition and management of the land under private ownership with conditions of commitment.

The final method of security will be decided on by Anglo American in consultation with OEH and other relevant agencies.

A.7 Cumulative Offsets

All of the mines in the area propose to rehabilitate mined areas and return them to forest and woodland. The mined landscaped will be progressively returned as flora and fauna habitat in the medium to long term. Additionally, all of the mines have provisions for offsetting ecological impacts. All of the mines will or have purchased additional surrounding lands that contain forest, woodland and Derived Native Grasslands. These will collectively and significantly increase the total areas of native vegetation that exist in the locality in the future and will significantly increase the total area of native vegetation within conservation reserves in the locality.

The Project is committed to minimising its contribution to cumulative ecological impacts in the region through the restoration of creek line vegetation and linkages to existing conservation areas, the retention of ridgeline communities and the staged rehabilitation of forest and woodland in the Project Disturbance Footprint, which will progressively add to the areas of forest and woodland habitat in the Hunter Valley. The medium to long term result will be an increased area of forest and woodland under conservation tenure and ongoing management.

Cumulative habitat loss in the Hunter Valley has been historically caused by a range of factors. Initially the largest and most widespread impacts were from clearing for agriculture and today a high proportion of the locality around the Project Disturbance Footprint has been heavily modified for agriculture. It is also notable that little in the way of conservation or reafforestation is being done on farms within the upper Hunter Valley generally. Past mining activities have also had a negative impact upon vegetation; until relatively recently mines were not required to rehabilitate mined areas back to forest or woodland.

By contrast, recent approvals of mines in the Hunter Valley require mining companies to rehabilitate land back to forest and woodland. Such approvals have been granted for Mt Arthur Coal, Drayton Mine, the Mount Pleasant Project and Ravensworth Mine Complex. All such mines have requirements to both create *in situ* offsets and to link such offsets with forest and woodland rehabilitation.

In the locality, current mining projects have been instrumental in establishing a suite of conservation areas in previously farmed land and the mining companies are required to maintain or improve native vegetation within such reserves. Examples include but are not limited to the Mt Arthur Conservation Area, the Saddlers Creek Conservation Area (within Mount Arthur Coal land) and the Drayton Wildlife Refuge.

Due to modern rehabilitation requirements, requirements to designate conservation areas and the requirements for offsetting, the mining industry will significantly increase the area of forest and woodland vegetation within the locality within the long term.

If approved, the Project will build upon proximate conservation areas managed by neighbouring mines including Mount Arthur Coal, Drayton Mine and Ravensworth Mine Complex. These measures will collectively increase the total areas of native vegetation that exist in the locality in the future and add to connectivity of habitats.

By contrast, large areas of farmland that are not to be mined have no substantive provisions for woodland conservation. In areas where farming is set to continue for the long term, woodland remnants have considerable potential to degrade over time.

A.8 Measures to Protect Threatened Species Onsite

A.8.1 Diuris tricolor (Pine Donkey Orchid)

A known population of *Diuris tricolor* occurs in the Drayton Wildlife Refuge. Since a wildlife refuge may be revoked at any time, Anglo American is willing to secure the area of the Drayton Wildlife Refuge supporting the *Diuris tricolor* population under an additional conservation mechanism, such as a Conservation Agreement under Part 4, Division 12 of the NP&W Act or a Biobanking Agreement under Part 7A, Division 2 of the TSC Act. It is recognised that in doing so, the local occurrence of the species will be protected in perpetuity. Anglo American plans to consult with OEH and other relevant agencies to progress the matter.

The possibility of translocating *Diuris tricolor* from the Project Disturbance Boundary to conservation areas will be considered by Anglo American; however, it is noted that because translocation of ground orchids is difficult (Vallee *et al.*, 2004; Sommerville *et al.*, 2013) it is unlikely to be successful. Seed and tissue propagation trials will be conducted of the *Diuris tricolor* population within the Project Disturbance Footprint. This will utilise genetic material that will be collected prior to clearing, to ensure local genetic diversity is not lost.

A.8.2 Cymbidium canaliculatum (Tiger Orchid)

OEH has recommended that the translocation of *Cymbidium canaliculatum* in the Project Disturbance Footprint be undertaken to address the Project impacts on the species. Epiphytic orchids typically have a high chance of successful translocation (Vallee *et al.*, 2004; Tremblay, 2008). Mangoola Coal, working with experts in the field, is in the process of developing best practice procedures for the salvage and translocation of a large number of *Cymbidium canaliculatum* from their approved disturbance area to suitable host trees in nominated Biodiversity Offset Areas. Monitoring of already translocated individuals indicates they are in good health (Umwelt (Australia) Pty Limited, 2012).

Considering the above, Anglo American is committed to the translocation of the *Cymbidium canaliculatum* individual from the Project Disturbance Footprint to a suitable conservation area. Translocation would be to suitable remnant woody vegetation in a recipient site as close as possible to the location where the plant naturally occurs. Options include the proximate Drayton Wildlife Refuge or primary ridgeline, subject to the availability of a suitable mature host tree.

This will ensure the individual and local occurrence of the species still remains within the Hunter catchment, and will be subject to protection mechanisms to be applied to the Project's offset lands.

Anglo American will consult with Mangoola Coal and appropriate experts regarding best practice for the translocation of Cymbidium canaliculatum. Translocation will be conducted according to the ANPC best practice guidelines, 'Guidelines for the Translocation of Threatened Plants in Australia' (Vallee *et al.*, 2004) to ensure successful translocation of the species.

A.8.3 Acacia pendula (Weeping Myall)

Anglo American has considered options to translocate individuals within the Project Disturbance Boundary; however, translocation is not considered to be a viable option for this species as it is known to be very difficult and is unlikely to succeed.

It is proposed that propagation trials be undertaken for *Acacia pendula* found within the Project Disturbance Footprint, once the plants are mature enough to produce seed. As with many Acacia species, propagation from seed is a reliable method (ANPS, 2006; ANPS, 2010; Simmons, 2012) and such trials would increase our knowledge of the biology of the species and retain the local genetic diversity of this disjunct population.

It is acknowledged that the endemic form of *Acacia pendula* is commonly known to be poor seeders (Bell *et al.*, 2007) and the likelihood of success under the current available information appears to be uncertain. For this reason, one extant patch of *Acacia pendula* will be retained near the Saddlers Creek restoration area and will not be cleared by the Project. It will be included within the Saddlers Creek restoration area and be permanently protected as part of that offset area.

A.8.4 Swift Parrot (Lathamus discolor)

MSC has commented that the Study Area is a forage location for the Swift Parrot (*Lathamus discolor*) as individuals were recorded foraging during 2011 surveys. The Swift Parrot is a generalist nectarivore that can forage on the blossoms of many different tree species. The species is likely to forage in the locality of the Study Area from time to time depending on their migration pathway and the availability of blossom resources at that time. Although the species is not likely to be present in the locality every season, it was acknowledged in the EA that flowering resources within the Study Area and wider locality may be locally significant for Swift Parrots as the vegetation represents islands of foraging habitat within a predominantly cleared agricultural landscape.

Considering the above, the BOP aims to enhance the quantity and quality of foraging habitat for the Swift Parrot in both the Onsite and Offsite Offset areas to maintain foraging resources for the species. Due to the staged nature of the Project and to the fact that rehabilitation and restoration works will be carried out concurrently, the BOP is capable of maintaining foraging habitat for the species over the life of the Project. Furthermore, provision has been made for regular monitoring to assess the improvement of potential foraging habitat as rehabilitation and restoration works progress.

A.9 Minimising Impacts during Development Works

In order to minimise clearing impacts and unnecessary disturbance to native vegetation, the following procedures will be implemented:

- The limits of clearing will be delineated during the construction process and marked clearly on plans and on the ground utilising a permit to disturb process;
- Native vegetation beyond the identified clearing areas will not be disturbed; and
- Ancillary facilities such as stockpile sites, site compounds and construction zones will not be located beyond the limits of clearing.

Where clearing of vegetation and fauna habitats will take place, pre-clearing and clearing protocols will be followed, including:

- Preparation of an inventory of trees and hollows to be removed, prior to clearing;
- Pre-clearance checks of hollow-bearing trees for the presence of bird nests and arboreal mammals, such as possums, gliders and bats, prior to felling;
- Safe removal of animals found to be occupying trees prior to the clearing of trees and their appropriate relocation into nearby woodlands;
- Where practicable, propagation of flora species of high conservation value to other suitable sites in the Study Area, e.g. threatened orchids and *Acacia pendula*;
- Where practicable, relocation of flora species of high conservation value to other suitable sites in the Study Area, e.g. threatened orchids and *Acacia pendula. Cymbidium canaliculatum* is an epiphyte that lives on live or dead trees and as such can be relocated (by translocating sections of its tree) to suitable habitat outside the Project Disturbance Footprint;
- Provision of nest boxes or location of salvaged tree hollows in nearby woodland to compensate for the hollows to be removed due to vegetation clearance, and the numbers to be proportional to the number of hollows removed;
- Placement of boulders and large logs in nearby areas of retained vegetation to allow their continued use as fauna habitat; and
- Implementation of a dam drainage protocol for any dams to be decommissioned that includes safe removal of animals to suitable alternate locations, timing of clearance works to non-breeding seasons for appropriate target species and chytrid protocols for ecologists and machinery entering the water to limit the transmission of disease.

Where possible, the retention and protection of large old canopy trees should be achieved (in areas where they remain); as these provide valuable habitat resources including hollows, woody debris and reliable blossom production as the resources within the Project Disturbance Footprint is lost over the life of the Project. It also involves protection of any remaining medium sized trees, which will replenish the population of large old trees in future as current individuals continue to senesce.

A.10 Monitoring and Reference Sites

In order to ensure that the biodiversity objectives for the Project are achieved, an ecological monitoring program including the use of reference sites will be developed to record the ongoing status and health of flora and fauna that is to be retained on the Study Area and in the offsite offset areas. This will provide feedback data to determine the level of success of the mitigation and compensation measures implemented for the Project. Such monitoring is typically undertaken using appropriate reference sites that are located away from mining activities to use as a baseline against which to compare the status of habitats in close proximity to mining.

This section discusses these strategies and their applicability to the Project.

A.10.1 Reference Sites

The establishment of reference sites is recommended by the *ICMM Good Practice for Mining and Biodiversity guidelines* to enable impacts resulting from mining to be better understood and quantified (International Council on Mining and Metals, 2006). Reference areas serve as a benchmark against which changes in biodiversity over time can be compared (for example, through the use of the BACI before-after/control-impact, approach). This approach collects and compares data from sites before and after the impact has occurred, and also from control (non-impacted) and impacted sites. Reference sites help to determine which changes are directly attributable to the mining operations and which are the results of unrelated outside factors. They are useful in rehabilitation, as they allow a desired endpoint to be set for rehabilitation efforts, and progress towards this endpoint through time can be quantified.

Reference sites for this Project will be selected before construction activities and mining commence. Ideally, locations suitable as reference sites should contain the same ecological community that is being impacted; be in a similar position in the landscape; have similar topography and disturbance history; and not be subject to impacts from the mine {International Council on Mining and Metals, 2006 #4684. Appropriate locations for reference sites will be determined in consultation with relevant government agencies as part of the finalisation of the BAP.

i. Statistical Analysis of Monitoring Data

At each reference site, a range of data will be collected in order to allow comparisons to be made between impacted and non-impacted sites. This would provide an indication of the potential impacts occurring as a result of the Project. The full range of data to be collected at each reference site will be developed to enable statistical analysis of data.

Statistical analysis of data will be an important tool to compare the progress of rehabilitation and restoration works against reference sites. Data will be added to a database annually so that it will form a data matrix that is amenable to appropriate analysis, for example, using classification and ordination techniques, parametric statistics, or Analysis of Similarity.

A.10.2 Monitoring

Monitoring activities will include the monitoring of reference sites as well as monitoring of vegetation communities, populations of threatened flora and fauna on the Study Area and offsets. The monitoring program will track the progress of regeneration of native vegetation in the Study Area and offsets, and will identify problems that require active management, such as infestations of weeds and feral animals, or failure of some areas of plant species to regenerate.

This section considers the broad principles to be considered for ecological monitoring programs; more detailed specifications for ecological monitoring will be contained in the BAP.

i. Vegetation Monitoring

A vegetation monitoring strategy will be established to determine the magnitude of the ecological impacts from mining activities on the various flora and fauna species known or likely to occur in the Study Area, and their habitats. The monitoring program would provide information to quantify the change in biodiversity over time within the Study Area. It is proposed that monitoring sites be established in areas of vegetation both inside and outside of the disturbance area and in designated reference sites. Regenerated areas are also proposed to be monitored in the long term to allow changes in species composition and structure over time to be quantified. Information should be used in adaptive management, in order to continually improve the outcomes of the rehabilitation and land management strategy. Appropriate data management procedures will be implemented to ensure that all data is collected using appropriate techniques and suitably analysed to allow meaningful spatial and temporal comparisons to be made. More specific details of the vegetation monitoring strategy will be contained in the BAP.

ii. Threatened Species Monitoring

Monitoring will be undertaken on selected threatened species of flora and fauna, in order to determine whether populations are being adversely affected by the Project.

Threatened species monitoring will:

- Enable the identification of the impacts of the Project on threatened species;
- Identify changes in population numbers over time;
- Determine the success of impact mitigation and conservation measures; and
- Highlight areas for improvement if these measures are found to be inadequate.

Threatened species monitoring will involve conducting targeted threatened species surveys in areas of known habitat in order to record the abundance of selected species. This should include both flora and fauna species. The level of monitoring effort would be determined according to risk level and biology of the particular species in question (e.g. coordinating with breeding or movement times).

A.11 Management Plans

A.11.1 Biodiversity Offset Management Plan

Site-specific Biodiversity Offset Management Plans (BOMPs) will be prepared as part of the BOP to prescribe ongoing management actions for the onsite offsets and offsite offset property. This is a key component of the BOP to ensure that the biodiversity values of the Project's offsets can be maintained and improved.

Each BOMP will explain the key management approaches and expected gains of the onsite and offsite offsets and prescribe a suite of measures that will be implemented. The BOMP will contain a description and plan of conservation measures (long and short term) and will include measures to protect local biodiversity values and address specific values of significance such as the occurrence of threatened species. The BOMP will include details of appropriate areas for rehabilitation and conservation, details of revegetation priorities and techniques, reference sites, monitoring methodology and key performance indicators against which to measure progress, and specify appropriate review periods where progress is reviewed and the BOMP updated as required.

The key objective of the BOMP will be to improve the condition of existing vegetation and to increase the area of Box-Gum Woodland and species habitat so that a gain in biodiversity value can be achieved. This includes the following specific aims:

- Maintenance and improvement of the condition of existing forest and woodland within all offset areas, specifically to improve conditions for threatened flora and fauna;
- Maintenance and improvement of derived native grassland areas to promote, through management of grazing pressure, natural succession towards woodland and or open forest;
- Rehabilitation of selected areas of low diversity native grassland by replanting trees and shrubs to promote a more rapid regeneration towards forest or woodland; and
- Improvement of habitat connectivity across offset lands, and from offset lands to adjacent native vegetation and mine rehabilitation in order to improve wildlife movement in the long term.

The BOMP will also be designed in accordance with the latest offset management guidelines made available by DoE. As such, the BOMP will include:

- A description of the threatened species and habitats within the offsite offset;
- A description of the freshwater habitats present;
- An assessment of the general condition and extent of the offset area and the identification of the key threats and risks;
- An assessment of the capacity of the offsite property for natural regeneration from soil seed banks and adjacent seed sources;
- A prescription of the most appropriate measures to restore forest, woodland and aquatic habitats;
- A prescription of an appropriate monitoring programme like that described in **Section A.10** and adaptive management strategies;
- Details of appropriate timeframes and achievable completion criteria to allow Anglo American to effectively plan, cost, measure and monitor the progress of the management works; and
- Details of the auditing and reporting arrangements for the BOMP.

All restoration works will be conducted generally in accordance with any restoration and biodiversity enhancement guidelines that may be made available by DP&I and OEH (see **Section A.4.5**). Some of the measures that will be employed to promote successful regeneration of woodland and forest will include weed and feral animal management, phased reduction of livestock management, track and trail management, active replanting and reseeding of vegetation within selected areas and monitoring; fire management; and ongoing monitoring. These will be guided by best practice guidelines and will be consistent with the desired outcomes of the draft National Recovery Plan for Box-Gum Woodland and Derived Native Grassland {DECCW (NSW), 2010 #3986}, and incorporated as appropriate into the BOMP.

The offset properties contain extensive areas of existing woodland and open forest that will form nuclei for ongoing regeneration of trees and shrubs into grassland areas. Such habitats will provide immediate and ongoing habitats for native plants and animals. Existing forest and woodland areas are currently mature, functioning examples of natural ecosystems, but their condition is expected to improve with time as trees mature, tree hollows are generated and as regeneration of understorey takes place when livestock grazing techniques are implemented (McIntyre *et al.*, 2002).

Derived native grasslands conforming to Box-Gum Woodland within the offsite offsets exhibit significant floral diversity, including scattered trees and shrubs. It is intended that grazing management, combined with the management of weeds and feral animals will be able to accelerate regeneration of these grassland areas to forest and woodland areas. Such habitats

are semi-natural and cannot currently be considered fully functional as they generally lack trees and shrubs. However, in the medium to long term, trees and shrubs are expected to regenerate into such areas if the condition of the land is improved through grazing and weed management (Lindenmayer *et al.*, 2010). It is expected that substantial regeneration will occur within the life of the Project and a mature, functional ecosystem will be established across much of these grassland areas within 50 years.

Low diversity native grasslands have low diversity of native ground covers and essentially no trees and shrubs. There are very few areas of low diversity native grasslands in the portion of the offsite offset property that will be reserved for conservation. Nevertheless, trees and shrubs will be planted into such areas to form nuclei of regenerating woody habitats that will then be able to progressively grow back into woodland or open forest. Replanting of such areas will take place early in the life of the Project (within the first five years) and it is expected that substantial regeneration of woody plants will occur within the life of the Project.

A.11.2 Biodiversity Action Plan

A BAP will be developed for the Project that will enable Anglo American to enact the 'avoid and mitigate' principles during the construction and operation of the mine. The BAP is the key document that will ensure that the Project's conservation objectives are met for mitigation works to be completed onsite and that impacts to biodiversity are adequately managed for the life of the Project.

The BAP is intended to be a working document that guides all facets of onsite biodiversity management and mitigation for the Project, and will include clear objectives and actions. The BAP will incorporate all of the impact mitigation measures as described in the previous sections and will provide detailed specifications for their implementation. The BAP will specify what measures will be undertaken, how they will be undertaken, and will provide a timeline to ensure that all activities are conducted according to the plan. The BAP will also make provisions to address specific such as the occurrence of threatened species.

The BAP will provide for a monitoring program and key performance indicators against which to measure progress. The BAP will specify appropriate review periods where progress is reviewed and the document updated as required.

The BAP will include, where appropriate:

- Detailed design of mitigation measures such as fencing, rehabilitation and soil conservation;
- Pre-clearing surveys and fauna rescue or translocation where practical;
- Vegetation clearing protocols;
- Rehabilitation and restitution of adjoining habitat where possible;
- Control and ongoing management of environmental and noxious weeds;

- Control and ongoing management of feral animals;
- Restoration and rehabilitation methods and protocols; and
- Details of the ecological monitoring program.

The BAP will include clear objectives, key performance objectives and management actions of biodiversity values to be protected and of the proposed mitigation measures including, where appropriate:

- Minimising human disturbance to native flora and fauna;
- Limiting clearance or disturbance of native vegetation;
- Minimising impacts to, and where possible protecting, threatened species and communities;
- Minimising impacts to aquatic habitats and species; and
- Ongoing monitoring of impacts on flora and fauna and implementation of adaptive management plans.

The BAP will also prescribe further information on the staged rehabilitation of all mine disturbed areas and will specify how the Study Area will be closed to mining and returned to other land uses. This will include post-mining land use, conceptual final landform design, and rehabilitation methodology.

The implementation of the BAP will be funded by Anglo American for the life of the Project.

A.12 Summary of the Biodiversity Offset Package

The BOP has been developed to compensate for the residual impacts on threatened species and ecological communities that cannot be addressed by avoidance and mitigation. The BOP also aims to satisfy the requirements stated in the EARs for the Project.

The BOP provides a significant conservation outcome for the Project by providing a suite of measures, both onsite and offsite, to mitigate and compensate for the ecological impacts of the Project. The focus of the BOP is on onsite restoration and rehabilitation of Saddlers Creek, which will be supplemented by conservation and ongoing management of offsite offset properties.

Some of the measures presented in the BOP include the following:

- Management of land that contains and/or can be regenerated to provide Box-Gum Woodland at a ratio that exceeds the minimum ratio of 6 ha of conserved land for each hectare to be cleared (i.e. a ratio of 6:1);

- Provision of land that contains or could be regenerated to provide Central Hunter Box-Ironbark Woodland, Narrabeen Footslopes Slaty Box Woodland and other non-TEC vegetation at a ratio that exceeds the minimum ratio of 3:1;
- Provision of land that includes habitat for all relevant threatened flora and fauna species that could be impacted by the Project;
- Provision of land that contributes to an existing regional biodiversity conservation strategy; and
- Re-establishment of habitat linkages to existing areas of habitat in the locality including existing native vegetation within and closely adjacent to the Study Area.

The BOP has been prepared in accordance with Anglo American's internal Biodiversity Performance Standard (2011), which is consistent with the "maintain or improve" approach as it requires that:

- The target of no net biodiversity loss or net positive contribution to biodiversity is to be considered at the operational level based on the biodiversity risk and/or opportunity posed to the business;
- Operational biodiversity action plans should be aligned with National Biodiversity Frameworks and take cognisance of regional and/or local conservation planning frameworks where these exist; and
- Where there is the potential for significant adverse or positive impacts on biodiversity the implications of this risk and/or opportunity facing the operation needs to be assessed and the extent of the risk or opportunity translated into a business case for biodiversity management.

The BOP is based upon key principles of offsetting, particularly that:

- Offsets should be targeted to the ecological communities and threatened species that will be impacted by the Project;
- Offsets should be commensurate with the magnitude of the impacts; that is, there should be a net increase in the size and condition of the community types, populations or habitat types that will be impacted by the Project; and
- Offsets should be lasting; that is, there should be a level of legal protection for offset areas.

A.13 References

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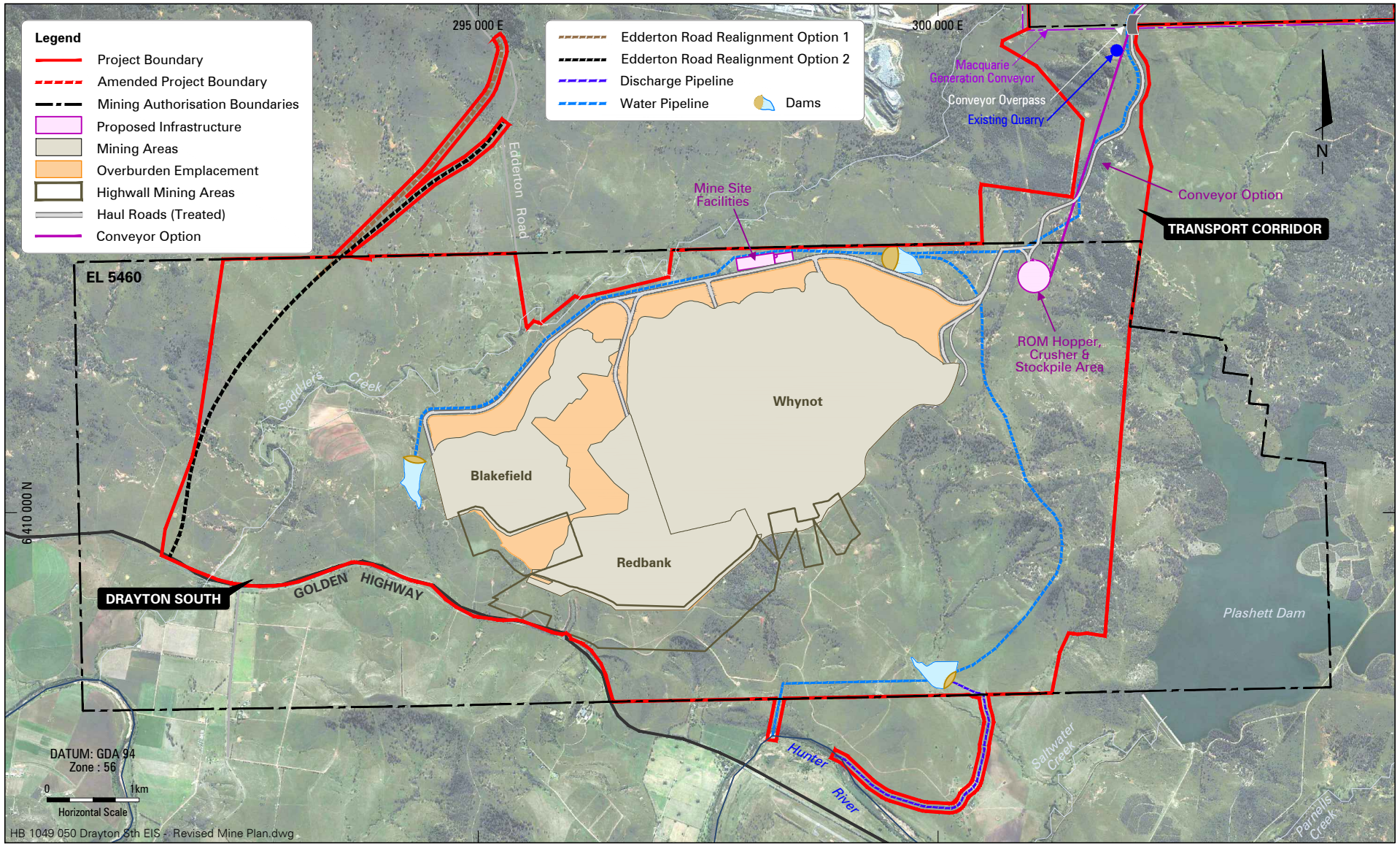
Appendix B

'Proposed Revised Mining Areas Figure A', February 2014



DRAYTON SOUTH COAL PROJECT

Proposed Revised Mining Areas

FIGURE A