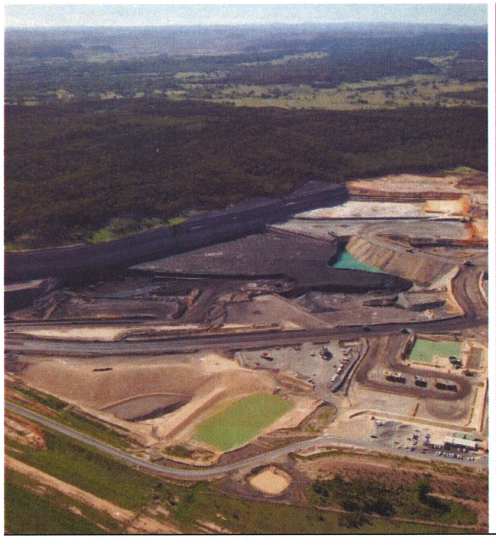

LANDSCAPE MANAGEMENT PLAN

REHABILITATION AND OFFSET MANAGEMENT PLAN

FINAL VOID MANAGEMENT PLAN

MINE CLOSURE PLAN

Version	Issue Date	Section Modified	Reason for Modification	Review Team
1	Apr 2010	All	Original Landscape Management Plan	J Thomas, AECOM, GSSE
2	June 2013	All	General Review and Update	Environmental Department

Approved: _____ Date: 25-11-2013

Title: Moolarben Coal Operations-General Manager

Document	Version	Issue	Effective	Review	Author	Approved
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1.0 INTRODUCTION

Moolarben Coal Operations Pty Ltd (MCO) owns and operates the Moolarben Coal Project (MCP) located in the Western Coalfields of New South Wales, east of Ulan and approximately 40 km northeast of Mudgee. MCO operates within the Mid Western Regional local government area, and is adjacent to the Ulan and Wilpinjong coal mines.

On 6 September 2007, the Minister for Planning approved Stage 1 of the MCP (Stage 1), Major Project 05_0117. Stage 1 consists of three open cut mines (OC1, OC2 and OC3); one underground mine (UG4); coal handling and preparation plant (CHPP) and raw and product coal stockpiles; a rail loop and rail loader; and office and workshop support facilities.

Stage 1 has approval to extract up to 8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal from the open cut mines and up to 4 Mtpa ROM coal from the underground mine. It can produce up to 10 Mtpa of product coals, which can only be transported from the site by rail. Stage 1 is approved to operate until 20 December 2028.

Schedule 3, Condition 44 of the Stage 1 Project Approval requires the preparation and implementation of a Landscape Management Plan (LMP), which must include a:

- Rehabilitation and Offset Management Plan (**Section 3.0**) in accordance with Schedule 3, Condition 45;
- Final Void Management Plan (**Section 4.0**) in accordance with Schedule 3, Condition 46; and
- Mine Closure Plan (**Section 5.0**) in accordance with Schedule 3, Condition 47.

Condition 3 of the Environmental Protection and Biodiversity Conservation (EPBC) approval (EPBC 2007/3297) requires the preparation of a Rehabilitation and Offsets Management Plan (**Section 3.0**).

This LMP has been developed to address the above consent conditions of the Project Approval and the EPBC approval. The original LMP was prepared by MCO in consultation with suitably qualified experts as indicated below and has subsequently been updated by MCO.

- Rehabilitation and Offset Management Plan – Dee Murdoch AECOM Australia Pty Ltd (AECOM) and sub consultants Leah Cook – Glade Consulting and Wendy Hawes (Technical Peer Review) – The Envirofactor.
- Final Void and Mine Closure Plans – Shaun Smith GSSE.

This LMP was prepared in consultation with the NSW Office of Environment and Heritage (OEH), NSW Office of Water (NOW) and NSW Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) for approval by NSW Department of Planning and Infrastructure (DP&I) and the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC). Copies of the correspondence can be found in **Appendix 2**.

This LMP has been prepared to fulfil the requirements of the relevant approvals listed in **Table 1** and Conditions presented in **Appendix 1**.

Table 1: MCO's Statutory Approvals

Approval/ Licence No.	Activity	Date of Approval	Agency
DA 05_0117	EP&A Act – Construct and Operate Stage 1	06 September 2007	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 1)	26 November 2008	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 2)	18 December 2008	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 4)	30 June 2009	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 5)	05 October 2009	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 6)	11 January 2010	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 7)	03 February 2011	DP&I
DA 05_0117	Stage 1 Project Approval (Mod 8)	27 May 2010	DP&I
2007/3297	EPBC Act – Disturb Threatened Species and Communities	24 October 2007	SEWPAC
ML1605	Rehabilitation	20 December 2007	DTI
ML1606	Rehabilitation	20 December 2007	DTI
ML1628	Rehabilitation	24 February 2009	DTI

1.1 OBJECTIVE

The objectives of the LMP are to:

- Provide a protocol for evaluating impacts on the landscape and meet all relevant statutory requirements;
- Manage MCO's operations in such a way as to minimise landscape impacts on sensitive receivers, structures and infrastructure; and
- Communicate with relevant stakeholders regarding MCO's operations.

2.0 OVERVIEW OF THE EXISTING ENVIRONMENT

2.1 LANDFORMS AND LANDUSE

MCO is located in the western end of the Hunter Valley, in the upper Goulburn River catchment. The Goulburn River catchment is the largest sub-catchment of the Hunter River covering just under one third of the total Hunter River catchment (of 22,000 km2). The majority of the local area is characterised as gently undulating agricultural land, mainly pasture, with moderate sized stands of native woodland vegetation retained along the steeper hillsides and ridgelines and in patches along creek or drainage lines. The Goulburn River National Park and the Munghorn Gap Nature Reserve are the largest and most diverse remnants remaining at 72,296 hectares and 5,934 hectares respectively.

A large portion of the Goulburn River catchment, both upstream and immediately downstream of the operations, is protected within Nature Reserves and National Parks. The Goulburn River National Park adjoins most of the north-eastern boundary of the operations, and conserves approximately 70,300 hectares of dissected sandstone country. Munghorn Gap Nature Reserve adjoins most of the south-eastern boundary of the operations, with two narrow peninsulas jutting into the operations, and conserves just under 6,000 hectares of sandstone pagoda formation country (NSW NPWS 2003). Both of these reserves are listed as National Heritage Areas under the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC).

The land ownership within the MCO project boundary is a mosaic of private land holders, Crown land, land owned by neighbouring Ulan and Wilpinjong coal mines and land owned/controlled by MCO. **Figure 1** provides a diagrammatic representation of the current ownership details. A portion of the land that has been identified as future offset areas is on privately owned land. The timing of acquisition by MCO will largely be dependent on the landowner's decision to sell.

The majority of the Project Approval area is characterised as gently undulating agricultural land, mainly pasture, with moderate sized stands of native woodland vegetation retained along the steeper hillsides and ridgelines and in patches along creek or drainage lines. Surrounding lands support similar vegetation patterns.

2.2 METEOROLOGY

MCO currently has two meteorological monitoring stations in accordance with Schedule 3, Condition 25 of the Project Approval. One is located adjacent to the MCO Administration Office (referred to as WS01) and the other station is located on Ulan Road (referred to as WS03).

Based on the Bureau of Meteorology climate monitoring data collected at Ulan Post Office Station No. 062036 and Ulan (Mittaville) Station No.062045 between 1901 and 2004, the average annual rainfall is approximately 640 millimetres. On average the distribution of the rainfall throughout the year is relatively uniform, but is slightly higher in the summer months. The heaviest daily falls have also generally been recorded during summer (December – February). Rainfall intensity is locally affected by the orographic influence of the Great Dividing Range.

A comparison between monthly average rainfall and monthly average potential evapotranspiration over the year indicates that on average the area has an excess evaporative capacity over rainfall in all months and can therefore be classified as having a semi-arid climate. There is variability in monthly rainfall and there would be periods when rainfall could exceed evapotranspiration during the winter months.

The mean daily temperature during January, the hottest month in summer, is 31.0^{o}C. The mean daily temperature in July, the coolest month in winter, is 14.6^{o}C. In summer daily temperatures can exceed 38^{o}C, while winter overnight temperatures occasionally drop below freezing point.

On an annual basis, the most common winds for the area are generally from the west and east with some winds from the northeast and east-northeast near Ulan and from the southwest in the south of

the MCO area. This pattern of winds is evident in all seasons with winds from the west being more common in winter and spring.

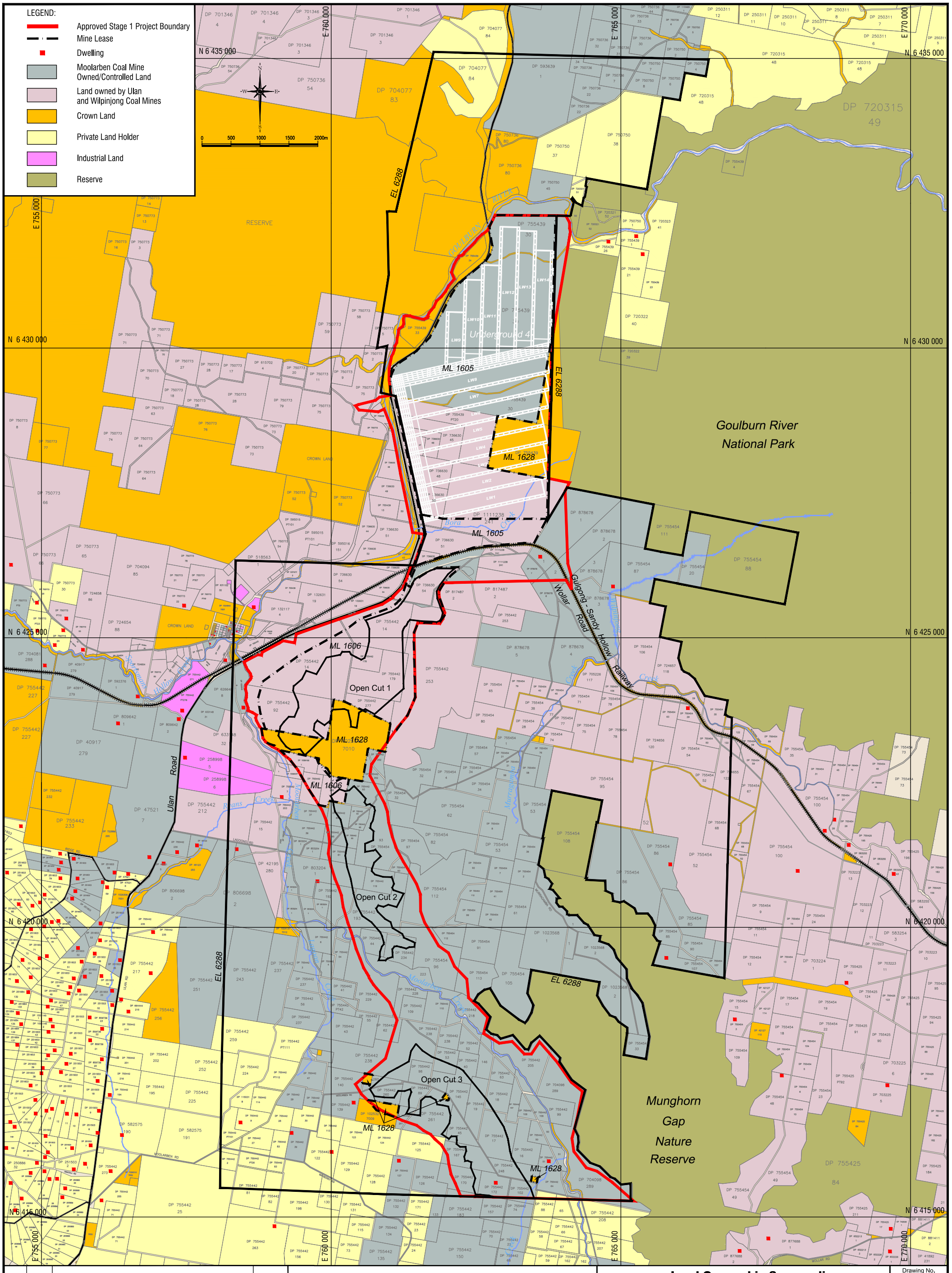
2.3 GEOLOGY AND SOILS

Soil landscapes of the MCO operational area are based on those delineated by the Soil Landscapes of the Dubbo 1:250,000 Sheet (DLWC 1998) and field surveys. Four main soil landscapes are found within the operational area, these being Ulan, Lees Pinch, Bald Hill and Munghorn Plateau. The Ulan Soil Landscape covers the majority of the open cut disturbance areas whilst the infrastructure area is located on the boundary of the Ulan and Munghorn Plateau Soil Landscapes. The Bald Hill Soil Landscape is found in isolated areas within the Underground No. 4 coal mine and adjacent to Open Cut 2.

Soils of the valley floor consist of narrow alluvials along the major creek lines, with adjoining terraces belonging to the Permian geological formation. Occasional conglomerate outcrops referred to as 'hard caps' are associated with 'tertiary channels', which occur as localised hills throughout the valley floor. Soils of the lower and central midslopes are generally derived from Permian conglomerates and clay stones, with the upper slopes often characterised by Triassic sandstones. The Ridgelines tend to have poor soil fertility due to the underlying Triassic geological formation (Narrabeen Sandstones). Basaltic rocky outcrops occur in some areas.

The major soil types found in the operational area include Yellow Podzolic, Red Podzolic, Earthy Sands, Yellow Solodic, Lithosols and Alluvials. The Yellow Podzolic soils are dominant throughout the Open Cut 2 and Open Cut 3 disturbance areas, on lower slopes and minor drainage lines. Red Podzolic soils occur predominantly in the disturbance areas of Open Cuts 2 and 3 on the upper mid slopes. Earthy Sands soils occur predominantly on the northern side of the Infrastructure Area. These soils are also found along Moolarben Creek in the Open Cut 3 disturbance area. Yellow Solodic soils occur in the low lying areas of Open Cut 1 and the Infrastructure Area. Lithosols occur on the higher plateaus and sandstone escarpments associated with the Underground No. 4 coal mine area. Alluvial soils occur along Moolarben and Lagoon Creeks drainage lines – but outside the operational disturbance areas.

Figure 1: Land Ownership Surrounding MCO



Rev.	Drawn	Description	Approved

MOOLARBENCOAL

Prepared by Pegasus Survey & Drafting Ph: 02 65 718888

Land Ownership Surrounding Moolarben Coal Operations

Drawing No. 09252

Revision No. A

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2.4 FLORA

In general, the valley floor vegetation has been cleared and disturbed, with Alluvial Apple Forest occurring as narrow strips along creek line corridors. Box and Red Gum Woodlands occur as remnant vegetation on the valley floors and adjacent lower slopes. Ironbark Forests occur on ridgelines and upper slopes in the south (south of the Ulan-Wollar Road) and Scribbly Gum Woodlands occur on ridgelines and upper slopes in the north (north of the Ulan-Wollar Road). The dominant species of each vegetation community is detailed in **Table 2** – **Table 6.**

Table 2: Sedimentary Ironbark Forests

Species Name	Common Name
Overstorey	
Eucalyptus fibrosa	Broad-leaved Ironbark
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus punctata	Grey Gum
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus macrorhyncha	Red Stringybark
Understorey	
Callitris endlicheri	Black Cypress Pine
Acrotriche rigida	Honey Pots
Persoonia linearis	Narrow-leaved Geebung
Allocasuarina gymnanthera	She-oak
Leucopogon muticus	Blunt-beard Heath
Melichrus urceolatus	Urn-heath
Acacia leucolobia	Box-leaved Wattle
Groundcover	
Aristida vagans	Three-awned Speargrass
Dichelachne micrantha	Short-hair Plume Grass
Austrostipa scabra	Rough Speargrass
Pomax umbellata	Pomax
Cheilanthes sieberi	Rock Fern
Goodenia hederacea	Forest Goodenia

Table 3: Dominant Species of Box Woodland

Species Name	Common Name
Overstorey	
Eucalyptus melliodora	Yellow Box
Eucalyptus moluccana	Grey Box
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus albens	White Box
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus dawsonii	Slaty Gum
Understorey	
Acrotriche rigida	Honey Pots
Lissanthe strigosa	Peach Heath
Cassinia arcuata	Sifton Bush
Cassinia quinquefaria	Cassinia
Dodonaea viscosa ssp cuneata	Wedge-leaf Hop Bush
Groundcover	
Aristida vagans	Three-awned Speargrass
Dichelachne micrantha	Short-hair Plume Grass
Austrodanthonia racemosa	Wallaby Grass
Cheilanthes sieberi	Rock Fern
Astroloma humifusum	Native Cranberry

Table 4: Dominant Species of Tablelands Red Gum Woodland

Species Name	Common Name
Overstorey	
Eucalyptus blakelyi	Blakely's Red Gum
Understorey	
Cassinia arcuata	Sifton Bush
Leucopogon virgatus	Beard-heath
Brachyloma daphnoides	Daphne Heath
Acacia linearifolia	Narrow-leaved Wattle

Calytrix tetragona	Common Fringemyrtle
Groundcover	
Aristida vagans	Three-awned Speargrass
Themeda australis	Kangaroo Grass
Austrodanthonia racemosa	Wallaby Grass
Arundinella nepalensis	Reedgrass
Cheilanthes sieberi	Rock Fern
Goodenia macbarronii	Narrow-leaved Goodenia
Hydrocotyle laxiflora	Stinking Pennywort
Gonocarpus tetragynus	Raspwort
Glossodia major	Waxlip Orchid
Thelymitra pauciflora	Slender Sun Orchid

Table 5: Dominant Species of Sedimentary Scribbly Gum Woodlands

Species Name	Common Name
Overstorey	
Angophora floribunda	Rough-barked Apple
Eucalyptus rossii	Inland Scribbly Gum
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus fibrosa	Broad-leaved Ironbark
Eucalyptus crebra	Narrow-leaved Ironbark
Understorey	
Callitris endlicheri	Black Cypress Pine
Leucopogon virgatus	Beard-heath
Leucopogon muticus	Blunt-beard Heath
Persoonia linearis	Narrow-leaved Geebung
Brachyloma daphnoides	Daphne Heath
Acacia linearifolia	Narrow-leaved wattle
Styphelia triflora	Five Corners
Correa reflexa	Native Fuchsia
Calytrix tetragona	Common Fringe-myrtle
Acacia leucolobia	Box-leaved Wattle
Allocasuarina gymnanthera	She-oak

Groundcover	
Platysace ericoides	Heath Platysace
Pomax umbellata	Pomax
Poranthera microphylla	Small Poranthera
Isotoma axillaris	Rock Isotome
Goodenia macbarronii	Narrow-leaved Goodenia
Goodenia hederacea	Forest Goodenia
Dianella revoluta	Flax Lilly
Lomandra confertifolia	Mat-rush

Table 6: Dominant Species of Alluvial Apple Woodlands

Species Name	Common Name
Overstorey	
Angophora floribunda	Rough-barked Apple
Eucalyptus moluccana	Grey Box
Eucalyptus crebra	Narrow-leaved Ironbark
Understorey	
Cassinia arcuata	Sifton Bush
Astroloma humifusum	Native Cranberry
Callitris endlicheri	Black Cypress Pine
Pultenaea microphylla	Spreading Bush-pea
Daviesia acicularis	Spiny Bitter-pea
Groundcover	
Aristida vagans	Three-awned Speargrass
Arundinella nepalensis	Reedgrass
Austrostipa scabra	Rough Speargrass
Microlaena stipoides	Weeping Meadow Grass
Lomandra confertifolia	Mat-rush
Cheilanthes sieberi	Rock Fern

The floristic survey conducted for the MCO Stage 1 Environment Assessment (EA) identified 500 plant species from 4,960 observations. Of the total observed species diversity, 428 were observed during quadrat sampling with the remaining 72 observed during opportunistic/targeted surveys (**Figure 2**).

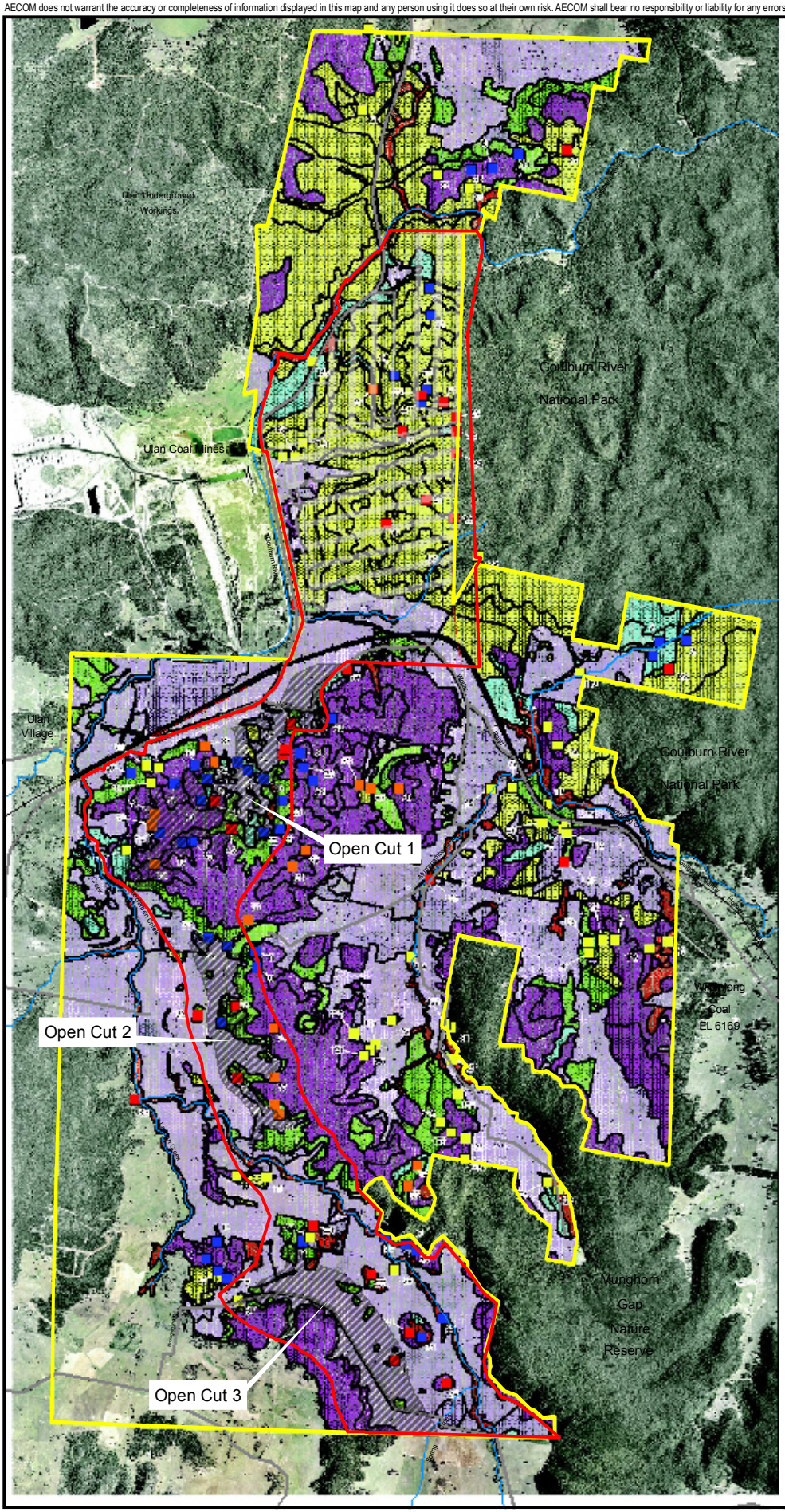
The presence of the Threatened Species Conservation Act (TSC) listed White Box Yellow Box Blakely's Red Gum Grassy Woodland and derived native grasslands (WBYBBRGW) was determined using the National Parks and Wildlife Service (NPWS, 2002) identification guideline. Components of this community are also included within the threatened ecological community – Grassy White Box Woodlands, which is listed separately under the Commonwealth EPBC Act. Six vegetation associations located within the MCO Project Approval area are consistent with the definition for the TSC Act and EPBC Act listed WBYBBRGW Endangered Ecological Community (EEC). There is 786.2ha of WBYBBRGW located within the area, with approximately 259.6ha contained within the MCO Project Approval area. Of this, the mining operation phase will result in the removal of approximately 64.68 ha. The operation will also result in the removal of 351 ha of non-EEC native vegetation, with the bulk of this vegetation loss associated with the Sedimentary Ironbark Forests. A diagrammatic representation of the vegetation associations is provided on **Figure 3**.

Three threatened plant species were recorded during the Environment Assessment (EA) study (**Figure 3**). One, the Commonwealth listed Hoary Sunray (Leucochrysum albicans var tricolor) will not be impacted by the mining operations. The other two will be impacted by OC1 including the loss of one individual of Double-tailed Donkey Orchid (Diuris tricolor) and the loss of approximately seven individuals of Capertee Stringybark (Eucalyptus cannonii). The locations of the threatened species are provided on **Figure 4**.

2.5 TERRESTRIAL FAUNA

The fauna survey conducted for the MCO Stage 1 EA identified 256 fauna species comprising of 170 birds, 37 mammals, 32 reptiles and 7 amphibians. Of these, there were 29 threatened fauna species and 14 declining woodland birds known or considered likely to occur in the EA study area (Figure 5). The assessment of fauna occupation within the EA study area indicated a relationship between local species distribution and Terrestrial Stratification Units (TSU). A higher diversity of fauna species was observed within the Box Woodlands TSU, with the majority of the species composition being woodland birds. Sedimentary Scribbly Gum Woodlands provided habitat for many microchiropteran bat species and reptiles due to the increased abundance of trees with hollows and surface rock. The majority of records of declining woodland birds were located within Disturbed Vegetation, Box Woodlands, Tableland Redgum Woodlands and Sedimentary Scribbly Gum Woodlands.

Table 7 lists the Threatened Species within the EA Study Area and adjoining locality.



Legend

Quadrats per Season

- Summer (44)
- Autumn (29)
- Winter (19)
- Spring (51)

(Total quadrats 143)

Broad Vegetation Communities

- Disturbed Vegetation
- Ironbark Forests
- Box Woodlands
- Tablelands Redgum Woodlands
- Scribbly Gum Woodlands
- Alluvial Apple Forests

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LEGEND

- EL 6288 Boundary
- DA Boundary
- Open Cut
- Underground
- Railroad
- Roads
- Rivers and Creeks

Data sources:
Base Data: Moolarben Coal Project Environmental Assessment Plan 34
(c) 2006 (Moolarben Biota)
(c) 2006 (Pegasus Technical)

VEGETATION COMMUNITIES
Plan 34 Stage 1 EA

Moolarben Coal Operations

Landscape Management Plan

Ulan, NSW

Figure 2

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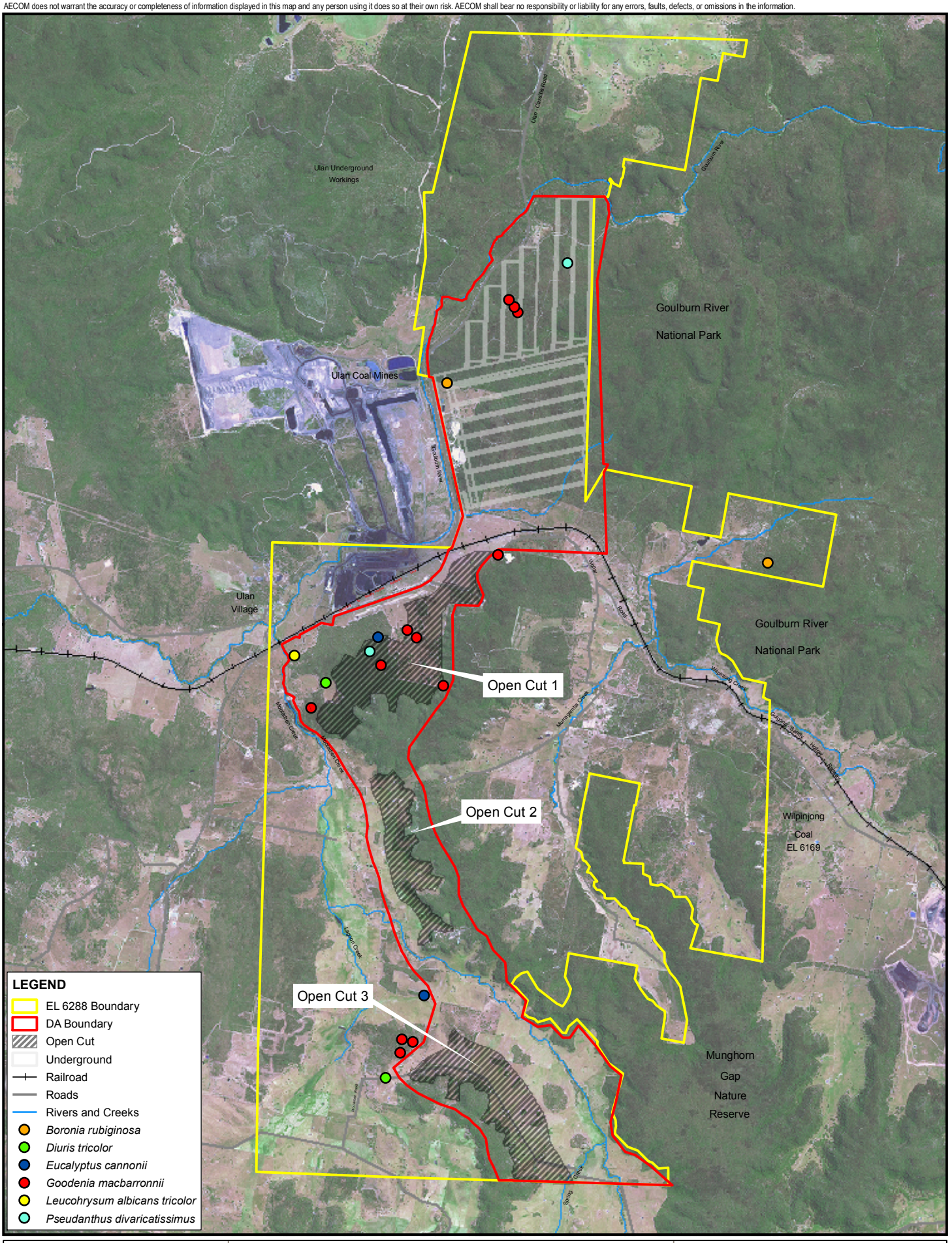

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Data sources:
Base Data: Moolarben Coal Project Environmental Assessment Plan 36
(c) 2006 (Pegasus Technical)

THREATENED FLORA SPECIES

Moolarben Coal Operations

Landscape Management Plan

Ulan, NSW

Figure 3

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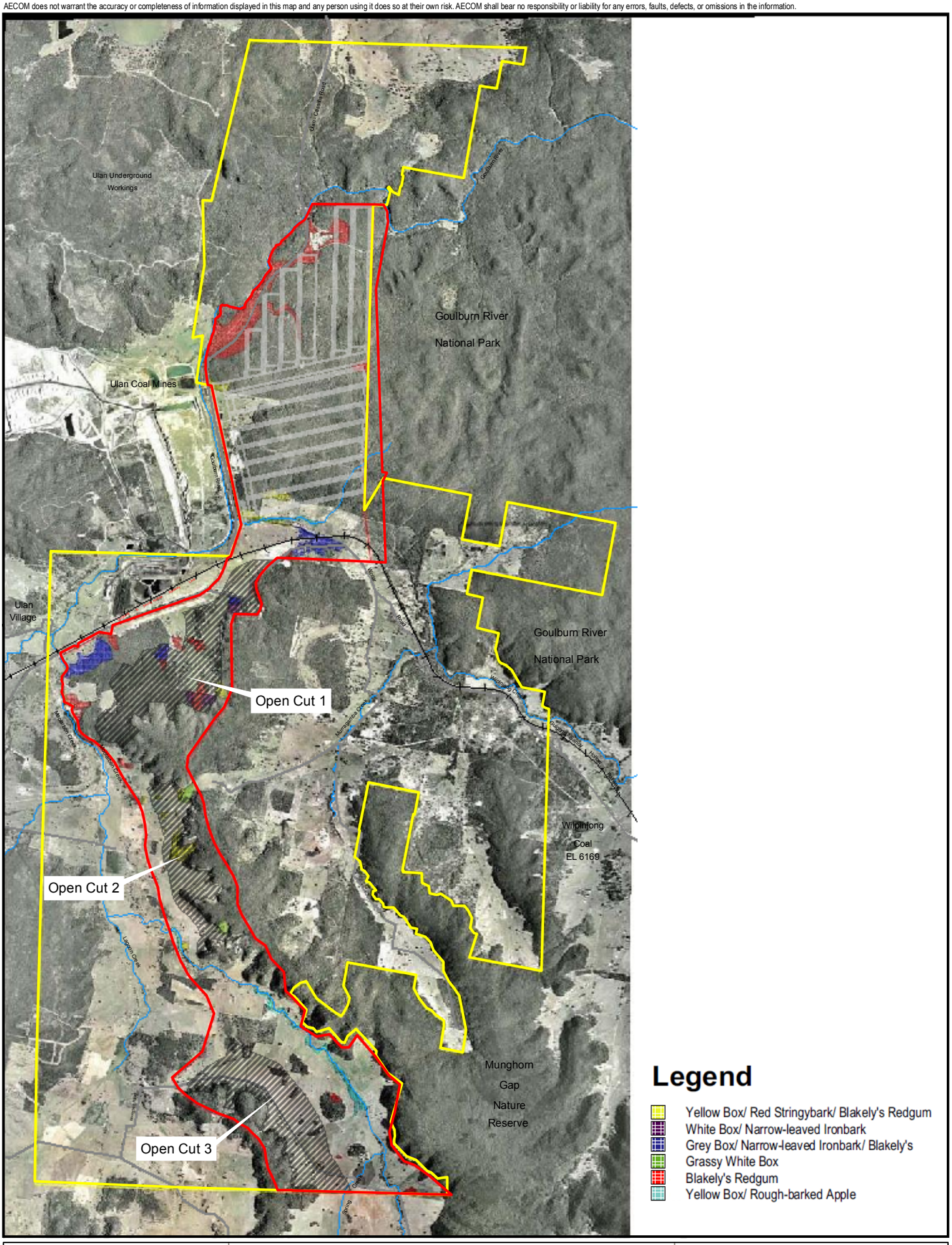

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LEGEND

- EL 6288 Boundary
- DA Boundary
- Open Cut
- Underground
- Railroad
- Roads
- Rivers and Creeks

Data sources:
Base Data: Moolarben Coal Project Environmental Assessment Plan 36
(c) 2006 (Pegasus Technical)

LOCATION OF ENDANGERED ECOLOGICAL COMMUNITIES
Stage 1 EA Plan 37

Moolarben Coal Operations

Landscape Management Plan

Ulan, NSW

Figure
4

Map Document: (O:\GIS_JOBS\Projects\N6056502_Moolarben\Maps\N6056502_F4_EEC_12Apr10.mxd)

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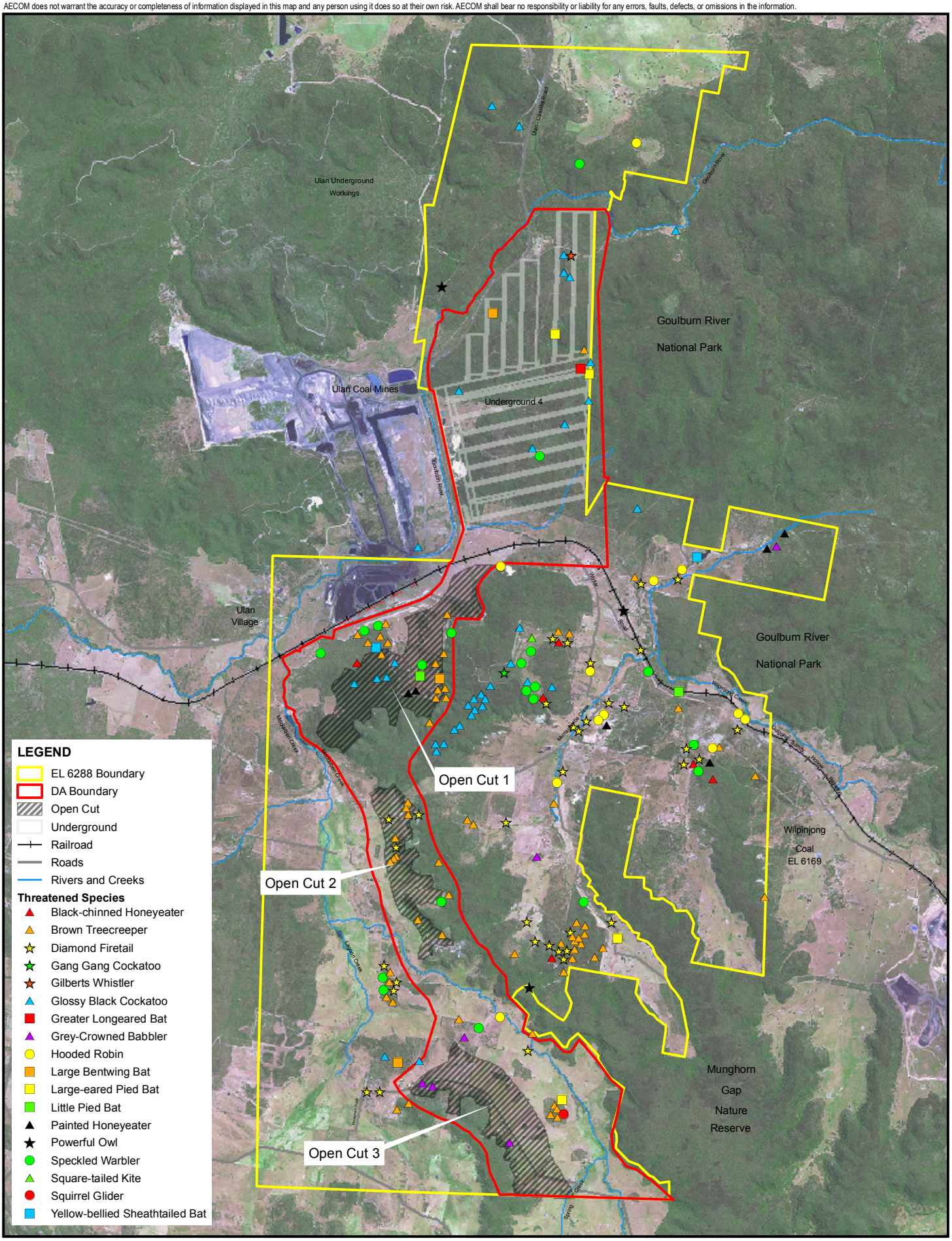

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LAST MODIFIED HW 12 APR 2010

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Data sources:
Base Data: Moolarben Coal Project Environmental Assessment Plan 38
(c) 2006 (Pegasus Technical)

LOCATION OF THREATENED FAUNA SPECIES
Adapted from Stage 1 EA Plan 38

Moolarben Coal Operations

Landscape Management Plan

Ulan, NSW

Figure

5

Map Document: (O:\GIS_JOBS\Projects\N6056502_Moolarben\Maps\N6056502_F5_ThreatenedFauna_12Apr10.mxd)

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Table 7: Location of Threatened Fauna Species within the Project Approval Area and Adjoining Locality

(data from Moolarben Coal Mines Pty Ltd, 2006, Appendix 11)

Species	Predominant/Likely Vegetation Community	Details
Bush Stone-curlew *Burhinus grallarius*	Not known.	Anecdotal landholder records in the study area.
Square-tailed Kite *Lophoictinia isura*	Box Woodlands. Disturbed Vegetation.	1 record.
Gang Gang Cockatoo *Callocephalon fimbriatum*	Most vegetation communities with *Callitris* sp.	1 record.
Glossy Black Cockatoo *Calyptoryhnchus lathami*	Most vegetation communities in EA study area.	39 records. Distribution likely to be based around important *Allocasuarina* feeding sites.
Swift Parrot *Lathamus discolor*	Not known.	May occur in the study area during mass flowering events. Winter visitor.
Turquoise Parrot *Neophema pulchella*	Box Woodlands.	May occur in the EA Study Area occasionally.
Powerful Owl *Ninox strenua*	Sedimentary Ironbark Forests. Sedimentary Scribbly Gum Woodlands.	3 records. Recorded in vegetation association with dominance or sub-dominance of Ironbark. Probably uses area for foraging, and nests in nearby NP estate.
Masked Owl *Tyto novaehollandiae*	Not known.	Anecdotal landholder records in the area. Probably only uses EA Study Area for foraging.
Barking Owl *Ninox connivens*	Not known.	Probably uses EA Study Area for foraging, and nests in nearby NP estate.
Gilbert's Whistler *Pachycephala inornata*	Disturbed Vegetation. Sedimentary Scribbly Gum Woodlands.	2 records.
Grey-crowned Babbler *Pomatostomus temporalis*	Box Woodlands Sedimentary Scribbly Gum Woodlands.	6 records.
Speckled Warbler *Pyrrholaemus sagittatus*	Box Woodlands. Sedimentary Ironbark Forests.	Widespread, 21 records

Species	Predominant/Likely Vegetation Community	Details
Brown Treecreeper *Climacteris picumnus victoriae*	Box Woodlands. Disturbed Vegetation.	Widespread, 76 records
Hooded Robin *Melanodryas cucullata cucullata*	Disturbed Vegetation	26 records. Seems to prefer habitats close to creeklines.
Black-chinned Honeyeater *Melithreptus gularis gularis*	Box Woodlands. Disturbed Vegetation. Sedimentary Ironbark Forests.	8 records. Mainly assoc with dominance or sub-dominance of Ironbarks. Likely to occur only in larger remnants.
Painted Honeyeater *Grantiella picta*	Most vegetation communities in EA study area.	6 records. Distribution likely to focus on areas with concentrations of Mistletoe of Amyema spp.
Regent Honeyeater *Xanthomyza phrygia*	Box Woodlands.	May occur in the EA Study Area, particularly during mass flowering events.
Diamond Firetail *Stagonopleura guttata*	Disturbed Vegetation. Box Woodlands.	52 records.
Giant Barred Frog *Mixophyes iteratus*	Not known.	Not likely to occur in EA Study Area, but some potential to be affected by downstream impacts.
Squirrel Glider *Petaurus norfolcensis*	Alluvial Apple Forests. Potentially also Box Woodlands.	1 record in Rough-barked Apple Forest, possibly close to nest site.
Large-eared Pied Bat *Chalinolobus dwyeri*	Disturbed Vegetation. Tablelands Red Gum. Woodland	9 records.
Little Pied Bat *Chalinolobus pictatus*	Disturbed Vegetation. Tablelands Red Gum. Woodland	3 records.
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	Not known.	Thought to prefer more extensive and less disturbed remnants.
Eastern Freetail Bat *Mormopterus norfolcensis*	Not known.	No details of preferences known.

Species	Predominant/Likely Vegetation Community	Details
Eastern Bent-wing Bat *Miniopterus shreibersi*	Tablelands Red Gum Woodland. Sedimentary Scribbly Gum Woodlands.	5 records.
Little Bent-wing Bat *Miniopterus australis*	Not known.	All records from region recorded in conjunction with Eastern Bent-wing Bat.
Greater Long-eared Bat *Nyctophilus timoriensis*	Tablelands Red Gum Woodland.	1 record
Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris*	Tablelands Red Gum Woodland Box Woodlands.	2 records
Eastern Cave Bat *Vespadelus troughtoni*	Not known.	No details of preferences known. Cave roosting.

2.6 AQUATIC FAUNA

During the MCO Stage 1 EA the sampling program recorded a total of 69 taxa for the study (51 insect taxa, 6 crustaceans, 4 gastropod molluscs, 2 leeches, and one water mite, springtail, ostracod, worm, bivalve mollusc and flatworm). No aquatic mammals (platypus or native water rat) were found during the study and although they could occur (at least in the lower part of the study area catchment in Goulburn River) none are expected. There were no threatened species found during this study and none are expected.

Studies conducted during the EA indicated that most of the creeks and drainages in the area are ephemeral or intermittent and there are few creeks with permanent (or even semi-permanent) pond or riffle areas. Further, this review (and subsequent reviews of later regional impacts assessments and of Ulan Mine aquatic survey results) indicated that there were no threatened aquatic plants, fish or macroinvertebrate species or populations (as listed under Commonwealth EPBC Act or under the NSW Fisheries Management Act 1994) listed or found in the upper Goulburn River. The best aquatic habitat is located in the Goulburn River sections below the Ulan Creek confluence; including the lower Bobadeen Creek section above the confluence.

2.7 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater Dependant Ecosystems (GDE) are defined as ecosystems that have their species composition and their natural ecological process determined by groundwater (DLWC, 2002). No terrestrial GDE mappable at the vegetation association level have been identified within the MCO Development Application (DA) area or impact zone. 'The Drip', on the Goulburn River north of Underground No. 4, represents the only significant seep/spring GDE within the locality, with native vegetation reliant on this surface expression of groundwater clearly evident within the cliff line of 'The Drip'. No impacts from MCO are expected on this GDE.

Parramatta Redgum (*Eucalyptus parramattensis*) located above UG4, is associated with high moisture retaining soils (i.e. shale influenced soils) within broad open drainage lines. However, this vegetation is not considered a GDE as the occurrence of this species in this area is clearly associated with localised topographic and soil conditions.

Whilst groundwater is known to provide base-flow to the main creeks and the Goulburn River, assessment of riparian vegetation did not indicate any specific riparian plant communities, which could be considered groundwater dependent.

Of the possible assessed GDE considered during the flora and aquatic studies, it is concluded that there are no GDE within the project area that are likely to be of specific importance to any threatened fauna species.

3.0 REHABILITATION AND OFFSET MANAGEMENT PLAN

3.1 PURPOSE

The purpose of the Rehabilitation and Offset Management Plan (ROMP) is to outline MCO's offset strategy and rehabilitation objectives, performance and completion criteria. The ROMP also defines rehabilitation monitoring and any contingency planning to mitigate potential risks.

3.2 POLICY AND REGULATORY CONTEXT

The following section provides a list of the various statutory requirements and policies that may be relevant to biodiversity and land management on the site:

Commonwealth
Environmental Protection and Biodiversity Conservation Act 1999

New South Wales
Crown Lands Act 1989
Environmental Planning and Assessment Act 1979
Environmental Planning and Assessment Regulation 2000
Heritage Act 1977
Local Government Act 1993
Mine Subsidence Compensation Act 1961
Mining Act 1992
National Parks and Wildlife Act 1974
Native Title Act (NSW) 1994
Native Vegetation Act 2003
Noxious Weeds Act 1993
Pesticide Act 1999
Rivers and Foreshores Improvement Act 1948
Roads Act 1993
Rural Fires Act 1997
Rural Lands Protection Act, 1998

Threatened Species Conservation Act 1995
Wilderness Act 1987.
State Policy
State Environmental Planning Policy (Infrastructure) 2007
State Environmental Planning Policy (Major Projects) 2005
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
State Environmental Planning Policy No. 44 – Koala Habitat Protection

Local
Mid-Western Regional Interim Local Environmental Plan 2008

3.3 MANAGEMENT OF RISKS

Any land management program must incorporate consideration of unpredicted impacts. This section of the ROMP has reviewed the impact of these unpredicted impacts via a risk based approach which assess the potential consequences and mitigation measures in terms of the consequence category - environment.

The methodology used for the risk assessment was generally in accordance with MCO's Risk Management Standard, which follows the general principles outlined in ISO 31000:2009 Risk Management (Standards Australia). The method used for the risk assessment encompassed the following key steps:

1. Establish the context for the risk assessment process;
2. Identify risks and potential impact;
3. Analyse risks;
4. Evaluate risks to determine the necessary controls for mitigation; and
5. Re-assess the risk post identification of additional controls.

The key risks associated with offset area rehabilitation/enhancement and land management have been assessed using the consequence and probability ratings, risk matrix and classifications listed in **Table 8**, **Table 9**, **Table 10** and **Table 11** respectively. **Table 12** outlines the key identified risks and associated inherent risk ratings. The ratings assume that the risks are untreated i.e. have not been addressed by specific risk mitigation measures.

Table 8 Probability Ratings

Classification	Probability
A	Almost certain to happen
B	Likely to happen
C	Possible
D	Unlikely to happen
E	Rare

Table 9: Consequence Ratings

	Hazard Effect/ Consequence				
Loss Type	**1 Insignificant**	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**
Environmental Impact	**Environmental nuisance –** trivial or negligible, short term impact to area of low significance, minimal or no physical remediation required No regulation. Cost < $1,000	**Minor environmental harm** – short term impact to area of limited local significance, limited physical remediation Reportable Breach/Minor Non Compliance, potential warning notice, other notices (infringement /prosecution) unlikely. Costs $1,000 - $5,000	**Serious environmental harm** – medium term impact to area of local conservation value, medium term physical remediation, actual community health impacts or significance or pollution or contamination Infringement Notice but Prosecution unlikely Costs $5k - $50k	**Major environmental harm** – long term reversible impacts to area of regional conservation significance, health statistics in community alter as a result of this incident or pollution or contamination Prosecution Costs $50k - $500k	**Extreme environmental harm** – irreversible impacts on environmental values of extreme & widespread areas, or those of national conservation significance, community fatalities or pollution or contamination Prosecution, License revoked Costs > $500k

Table 10: Risk Matrix

		Probability (P)				
		A	**B**	**C**	**D**	**E**
Consequence	**5**	**1**	**2**	**6**	**10**	**15**
	4	**3**	**4**	**9**	**14**	**19**
	3	**5**	**8**	**13**	**18**	**22**
	2	**7**	**12**	**17**	**21**	**24**
	1	**11**	**16**	**20**	**23**	**25**

Table 11: Risk Classification

Classification	Score	Guideline for Risk Controls
Extreme Risk (E)	21-25 (Red)	Stop operations or don't proceed with activity (Make Safe). Immediate intervention required from Senior Management.
High Risk (H)	13-20 (Orange)	Imperative to eliminate or reduce by introduction of controls, do not proceed with activity until reviewed by Senior Management.
Medium Risk (M)	6-12 (Yellow)	Corrective action to be determined, do not proceed without authorisation from Shift Coordinator.
Low Risk (L)	1-5 (Green)	Safe to continue activity once hazards minimised.

Table 12: Key Risks Associated with Land Management and their Controls

Risk	Consequence	Probability	Inherent Risk Rating	Proposed Risk Controls
Delayed acquisition of land within the acquisition zone which leads to delayed/limited implementation of the LMP.	**3**	**C**	**13 (H)**	Identify the generic conditions for biodiversity and other required environmental outcomes. Include these in sale/lease contracts. Review the LMP regularly to reflect current land ownership. Identify other lands that could be utilised.
Destruction of native vegetation included in 1,282ha offset area.	**3**	**C**	**13 (H)**	Native vegetation is on land owned by MCO.
Inappropriate bushfire management regime leading to widespread failure of revegetation or continued sustainability of offset area ecosystems and mine rehabilitation areas.	**3**	**C**	**13 (H)**	Selection of fire-tolerant species for revegetation and rehabilitation and adoption of standard fire prevention measures. Mosaic burning and monitoring of areas following fires, with follow-up replanting/reseeding if indicated by monitoring results. Maintain contingency supplies of seed for key native species.
Major storm event resulting in flooding, geotechnical instability, major erosion and/or widespread damage to rehabilitated area.	**3**	**C**	**13 (H)**	Design final landforms, structures and revegetation to cope with major storm events. Monitoring of rehabilitation/offset areas following a major storm and replanting /reseeding as necessary.

Risk	Consequence	Probability	Inherent Risk Rating	Proposed Risk Controls
Severe and/or prolonged drought leading to widespread failure of revegetation/rehabilitation.	**3**	**C**	**H**	Selection of drought-tolerant species within species mix for revegetation and rehabilitation. Monitoring of rehabilitation/offset areas following an event and replanting / reseeding as necessary. Maintain contingency supplies of seed for key native species.
Inadequate or insufficient topsoil to create/enhance the desired ecological communities on offset areas and mine rehabilitation areas.	**3**	**C**	**H**	Develop procedures for topsoil management, overburden and substrate management and soil testing. Topsoil inventory developed i.e. mapped at stripping and return. Assess stripped topsoil for weed contamination and limit spread of weed contaminated topsoil on or near areas of good native groundcover. Soil type matched to enhanced or rehabilitated vegetation association. Subsoil material assessed for use as a suitable growing media. Identify soil ameliorants (e.g. biosolids) that could be used as a topsoil substitute.

Risk	Consequence	Probability	Inherent Risk Rating	Proposed Risk Controls
Inadequate weed and pest animal control leading to widespread failure of revegetation or rehabilitation or continued sustainability of offset area ecosystems.	**3**	**C**	**H**	Targeted weed management and control program developed and implemented. Pest animal management and control program developed and implemented. Educate persons undertaking weed control to the major weed threats in the area and on site. Visual inspections/cleaning of vehicles entering sensitive areas to mitigate risk of weed dispersal.
New regulatory requirements or evolving community expectations leading to difficulties negotiating or attaining completion criteria.	**3**	**C**	**H**	Monitor trends and developments in legislation and changes to community and regulatory expectations.
Insect attacks (e.g. locusts and beetles) leading to failure of revegetation or rehabilitation or continued sustainability of offset and mine rehabilitation area ecosystems.	**3**	**C**	**H**	Planting to avoid insect prone periods. Use of endemic species which are suited to localised insect predation. Monitoring program results to identify if further plantings required.
Inappropriate planting and/or direct seeding techniques resulting in a failure of revegetation or rehabilitation or continued sustainability of offset area ecosystems.	**3**	**C**	**H**	Assessment prior to undertaking any replanting works in offset areas to establish whether planting although well-intentioned may degrade extant vegetation through the potential introduction of weeds and/or groundcover disturbance. This is particularly important in Box Gum Woodland and derived grasslands with native groundcover.

Risk	Consequence	Probability	Inherent Risk Rating	Proposed Risk Controls
Local fauna extinctions resulting from the delay in establishing existing habitat values of cleared vegetation in revegetated areas (e.g. connectivity, hollows, fallen timber, litter).	**3**	**C**	**H**	Annual fauna monitoring program. Utilise hollow/nest boxes of similar dimensions in vegetation that won't be cleared. (Note hollows /nest boxes should not be placed in patches with a healthy hollow occurrence as it increases aggression and competition for resources). Using logs, litter and debris from cleared timber to create groundcover habitat elements in revegetated and habitat depauperate rehabilitation areas.
Inappropriate fertiliser application (type and rate) leading to failure of revegetation or rehabilitation or continued sustainability of offset area ecosystems.	**3**	**D**	**M**	Fertiliser application program to match vegetation needs.
Frost leads to high mortality rates of revegetation and rehabilitation (average of 42 days frost/year).	**2**	**C**	**M**	Monitoring program results to identify if further plantings required. Contingency plant material propagated and used in maintenance programs. Avoid plantings in frost season.
Inappropriate grazing (native species, pests and livestock) regime leading to failure of revegetation or rehabilitation or continued sustainability of offset area ecosystems.	**2**	**C**	**M**	Fencing of offset areas and rehabilitation to exclude grazing of domestic stock under normal situations. Crash grazing may be required to reduce fuel loads and to minimise the risk of a bushfire. Use of deterrent substances on tube stock prior to use. Use of plant tubes to protect seedlings from grazing e.g. hares.

Risk	Consequence	Probability	Inherent Risk Rating	Proposed Risk Controls
Damage from unauthorised entry into offset and rehabilitation areas.	**2**	**C**	**M**	Fencing and signposting of offset areas and rehabilitation. Lock gates at access points with access managed by the environmental department, where possible. Security patrols.
LMP implementation delayed/limited due to land use changes – changes in mine plan.	**2**	**C**	**M**	LMP to be regularly reviewed and reflect current mine plans while meeting obligations. Communicate with mine planners on the restrictions of accessing/mining offset areas. Communicate with mine planners the requirement for continual rehabilitation works.
Competition from other native vegetation – e.g. other native species invading designated offset EEC areas.	**2**	**C**	**M**	Targeted monitoring program.[1] Implementation of select control program to remove invasive native species in early phases of the revegetation programs.
Incompatible neighbouring land owner practices leading to failure of rehabilitation and revegetation works.	**3**	**D**	**M**	Communicate the LMP with neighbouring properties, the CCC and local community.
Planning - insufficient provision of financial, human and equipment resources leading to failure to meet completion criteria, including increased maintenance costs and timeframe.	**3**	**D**	**M**	Budgetary allocation sufficient to cover requirements with resources available to implement LMP.

[1] Some non-EEC volunteer species may assist in the long term reestablishment of EEC. The monitoring program should identify if a species is potentially going to hinder EEC establishment.

Risk	Consequence	Probability	Inherent Risk Rating	Proposed Risk Controls
Inadequate or insufficient (incorrect species mix/quality) seed/seedlings for enhancement/revegetation of offset areas and rehabilitation works.	**2**	**C**	**M**	Species list reflective of target vegetation community. Use of local provenance seed and/or seedlings. Depending upon seed viability may require identification of suitable alternate seed sources from within the general locality. Seed collectors are familiar with the species for which seed is required. Monitoring to measure achievements on a time scale, and against completion criteria.
Limited availability of contractors and/or equipment to undertake land management works.	**3**	**D**	**M**	Develop relationship with variety of specialty contractors. MCO have equipment and operators available.
Unforseen impact to vegetation communities on land above underground 4 due to subsidence.	**2**	**D**	**L**	Subsidence monitoring provides timely provision of data relating to impact of subsidence. Contingency budgetary allocation for remedial works associated with subsidence. Subsidence Management Plan to address impacts on vegetation.

3.4 OVERVIEW OF MCO BIODIVERSITY MITIGATION STRATEGY

The biodiversity mitigation strategy for MCO aims to achieve a 'maintain and enhance' ecological outcome resulting in a net positive biodiversity benefit in the post-developed landscape. The broad objectives of the strategy are to:

- Avoid impacts on areas of high ecological value;
- Enhance local vegetation cover;
- Increase patch utilisation of isolated vegetation remnants by local biodiversity such as woodland birds;
- Improve connectivity between Munghorn Gap Nature Reserve and Goulburn River National Park;
- Improve connectivity between Dexter Mountain and Munghorn Gap Nature Reserve through revegetation and management; and
- Secure the local conservation of Endangered Ecological Communities, their habitats and important local biodiversity.

Details on how MCO propose to meet the objectives of the Biodiversity Mitigation Strategy, together with information on assessment criteria and the associated monitoring program are provided in **Table 13**. During the life of the mine assessment criteria will be made more specific in consultation with relevant government agencies and other stakeholders as mining operations progress.

As part of the process of building a network of protected areas, OEH are encouraging voluntary protection agreements in partnership with private and other public landholders to complement its public reserve system. These include Conservation Agreements, Wildlife Refuges and Aboriginal Places under the National Parks and Wildlife Act 1974 and Wilderness Protection Agreements under the Wilderness Act 1987. The priorities for conservation of private land include:

- Poorly reserved ecosystems in all regions, but particularly within poorly reserved or vegetated sub-bioregions in the Western Division, western slopes and plains, tablelands and most coastal valleys and lowlands;
- Protecting perimeters of existing OEH reserves and important corridors and links between them;
- Places where Aboriginal people and other landowners seek to protect cultural values; and
- Areas where establishing a Conservation Agreement, Wildlife Refuge or Aboriginal Place will help to promote broader conservation outcomes in the wider community.

The offset areas of MCO meet two of these priorities. Some of the offset areas include the EEC WBYBBRGW which has been enhanced or re-created. Secondly, the Goulburn River National Park adjoins most of the north-eastern boundary of the operations and Munghorn Gap Nature Reserve adjoins most of the south-eastern boundary of the operations, with two narrow peninsulas jutting into the operations. MCO's offsets have the potential to provide important linkages between these two reserves.

Table 13: Management in Terms of the Biodiversity Mitigation Strategy

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
Management Goal - Avoid impacts on areas of high ecological value			
As required by Project Condition 42 (e) of the Consent (05_0117) MCO shall conserve and enhance at least 1,282 hectares of existing native vegetation on Properties 6, 10, 12, 13, 14 and 15 (Areas 1, 2 and 3).	Enter into appropriate protection mechanisms (e.g. Conservation Agreement) for identified areas to provide a secure long term beneficial outcome for local biodiversity.	MCO have entered into appropriate protection mechanisms. The timing of these agreements will be dependent on land acquisition and approval time frames from relevant government agencies.	As per liaison with relevant agencies.
	Strategic implementation of bushfire management –further details are provided in **Section 3.23**		
As required by Condition 41 of the Consent (05_0117), MCO shall transfer at least 135 hectares of White Box Yellow Box Blakely's Red Gum Woodland to the Minister for Climate Change, Environment and Water to offset, on a "like for like" basis, the area cleared by the project at an offset ratio of 2:1.	Lands transferred to Minister for Climate Change, Environment and Water.	The lands were transferred in December 2010.	Due to the dedication and transfer of these lands to NPWS estate, MCO accepts no further management obligation or liability relating to the biodiversity value of these lands.
MCO shall provide OEH with funds (which at the discretion of OEH may include an in-kind contribution) to cover any reasonable costs associated with the transfer of the above land and ongoing management of this land.	MCO have provided relevant funds to OEH.	These funds were transferred on 29 September 2008. The transfer of these lands were finalised in December 2010.	As these lands have been transferred to NPWS estate, MCO accepts no further management obligation or liability relating to the biodiversity value of these lands.
Within 3 months of the approval of	MCO provided relevant funds to	MCO have transferred sufficient	Bond funds transferred within 3

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
the Landscape Management Plan, the Proponent shall lodge a bond with the Department to ensure that the vegetation offsets are implemented in accordance with the performance and completion criteria of the Landscape Management Plan. The sum of the bond shall be determined by calculating the full cost of implementing the vegetation offsets.	DP&I.	funds in the form of a bond, which has been verified by a suitably qualified quantity surveyor, to the satisfaction of the Director-General.	months of approval of the LMP.
As required by Condition 42 (a) of the Consent (05_0117), MCO shall conserve at least 6 hectares of existing White Box Yellow Box Blakely's Red Gum Woodland EEC on Property 6 (Area 3).	Conserve the White Box Yellow Box Blakely's Red Gum Woodland as described in **Section 3.5**.	The White Box Yellow Box Blakely's Red Gum Woodland will be conserved and protected in Area 3. This area was fenced and the lands protected in 2011.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity (flora and fauna) and habitat creation.
Management Goal - Enhance local vegetation cover			
As required in Condition 42 (b) of the Consent (05_0117) MCO shall enhance and conserve at least 2.6 hectares of regenerating White Box Yellow Box Blakely's Red Gum Woodland on Property 6 (Area 3).	Conserve and enhance these areas using tube-stock, seed or plant species sourced from local populations consistent with the White Box Yellow Box Blakely's Red Gum Woodland as described in **Section 3.5**.	The land will be conserved and revegetated aligned to the White Box Yellow Box Blakely's Red Gum Woodland. This area was fenced and the lands protected in 2011.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity (flora and fauna) and habitat creation. Species diversity is consistent with analogue sites for over storey species within the targeted White Box Yellow Box Blakely's Red Gum Woodland.

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
As required by Condition 42 (c) revegetate disturbed land with at least 48 hectares of White Box, Yellow Box, Blakely's Red Gum endangered ecological community on Properties 6, 10, 12, 13, 14 and 15 (Areas 1, 2 and 3).	Areas will be revegetated with tube-stock, seed or plant material soured from local populations.	48ha will have been revegetated with the White Box Yellow Box Blakely's Red Gum Woodland EEC by 2028. Work commenced in 2011.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity (flora and fauna) and habitat creation. Species diversity is consistent with analogue sites for over storey species within the targeted White Box Yellow Box Blakely's Red Gum Woodland.
As required by Modified Condition 42 (d) revegetate at least 153 hectares of cleared land on Properties 12,13,14 and 15 (Area 1) with suitable native vegetation.	Areas will be revegetated with tube-stock, seed or plant material soured from local populations (for instance endemic species such as *E. blakelyi* and *Angophora floribunda)*.	153ha of cleared land will have been revegetated aligned to existing native vegetation associations by 2028. Work commenced in 2011.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity (flora and fauna) and habitat creation.
Management Goal - Enhancement of isolated vegetation remnants			
Increase patch utilisation of isolated vegetation remnants by local biodiversity such as woodland birds.	Fertiliser application will be limited in remnant vegetation patches. Roosting/nesting boxes are to be used in offset areas to provide short-term habitat resources for threatened fauna species. Habitat features such as large hollows will be salvaged during vegetation clearance activities and utilised in the offset areas, where safe and practical.	Increase in diversity and abundance of woodland bird species in areas of isolated remnant vegetation. Species diversity is consistent with analogue sites for over storey and mid-storey species to reflect targeted vegetation communities.	Seasonally relevant avian fauna monitoring program using defined transect locations. Monitoring of revegetated areas. Monitoring of areas where weed and feral animal control has been implemented. Monitoring of the placement and utilisation of habitat features and artificial roosting/ nesting boxes.

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
	Areas will be revegetated with tube-stock, seed or plant material soured from local populations (for instance endemic species such as *E. blakelyi* and *Angophora floribunda)*.		All monitoring data recorded using GIS as a basis for future decisions making.
	Implementation of weed control aligned to the seasonality of key noxious species.		
Management Goal - Improve connectivity between Munghorn Gap Nature Reserve and Goulburn River National Park			
Improve connectivity between Munghorn Gap Nature Reserve and Goulburn River National Park through revegetation and appropriate management.	Enhance native vegetation.	Increase in diversity and abundance of woodland bird species in areas of isolated remnant vegetation. Increase in diversity and abundance of native vegetation species.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity (flora and fauna) and habitat creation.
Management Goal - Improve connectivity between Dexter Mountain and Munghorn Gap Nature Reserve			
Improve connectivity between Dexter Mountain and Munghorn Gap Nature Reserve through revegetation and appropriate management.	Enhance native vegetation.	Increase in diversity and abundance of woodland bird species in areas of isolated remnant vegetation. Increase in diversity and abundance of native vegetation species.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity (flora and fauna) and habitat creation.
Management Goal - Secure the local conservation of Endangered Ecological Communities, their habitats and important local biodiversity			
Avoidance (where possible) of White Box Yellow Box Blakely's Redgum Woodland and Woodland bird habitat.	The areas defined as EEC are recorded using GIS. These areas are where practical allocated a No Go status.	Data on location of EEC is recorded using GIS.	Annual monitoring to assess extraneous impact on these sites with all data recorded using GIS.

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
Management Goal - Habitat Enhancement (particularly for woodland birds and bats)			
Increasing the continuity of woodland vegetation in the locality.	Retention of standing trees (dead or alive). Retention of bush rock. Selective planting of WBYBBRGW EEC important species using tube-stock or direct seeding.	Increase in diversity and abundance of woodland bird species in areas of isolated remnant vegetation. Species diversity is consistent with analogue sites for over storey species within the targeted WBYBBRGW.	Seasonally relevant avian fauna monitoring program using defined transect locations. All monitoring data recorded using GIS as a basis for future decisions making.
Management Goal - Weed and Feral Animal Control			
Promote biodiversity through weed and feral animal control programs.	Management and control of noxious and environmental weeds and feral animals using appropriate means prior to, during and post the rehabilitation program - further details are provided in **Sections 3.19 and 3.20**	Program of works for the management and control of weeds and feral animals has been designed and implemented. On ground controls works commenced in 2010. See **Sections 3.19** and **3.20** for more detail	3.4.1 Monitoring of areas where weed and feral animal control has been implemented. 3.4.2 All monitoring data recorded using GIS as a basis for future decisions making.
Management Goal - Enhanced diversity and abundance of native flora			
Encourage natural regeneration.	Implementation of appropriate land management practices such as strategic grazing/exclusion of livestock, bushfire management, nutrient management, controlling the perennial grass biomass to encourage forbs and herbs.	Increase in diversity and abundance of woodland bird species in areas of isolated remnant vegetation. Increase in diversity and abundance of native vegetation species.	Seasonally relevant avian fauna monitoring program using defined transect locations. All monitoring data recorded using GIS as a basis for future decision making.

3.5 MANAGEMENT OF OFFSET AREAS

The Development Consent and EPBC Approval require a total of 1626.6ha of land to be managed as offsets for Stage 1. This land is required to be managed to enhance, rehabilitate and or conserve WBYBBRGW EEC or suitable native vegetation to improve wildlife corridor linkages in the local area. The location of the offset areas is provided in **Figure 6**.

3.5.1 Land Transfer

The funds for the transfer and ongoing management of 135ha were paid to OEH on 29 September 2008. The dedication of land for incorporation into the Goulburn River National Park was completed in December 2010. No further action from MCO is required in relation to the ongoing management of this land.

3.5.2 Enhancement and Conservation of Land

The main protection/conservation strategy for these areas is fencing to exclude stock and to control access. Stock was excluded from the conservation areas prior to 2009 and establishment and maintenance of fencing is an ongoing activity. More information on these activities can be found in **Sections 3.21** and **3.22**.

The other main requirement is protection from bush fires. More information on this can be found in **Section 3.23**.

Weed control, feral animal control and ongoing monitoring are important for the conservation and enhancement of these areas. Weed and feral animal control in these areas commenced in 2010 and are undertaken on an ongoing basis. More information on these activities can be found in **Sections 3.19**, **3.20** and **3.25**.

LEGEND:

- Stage 1 Project Boundary
- Moolarben Coal Mine owned/controlled land
- Ulan or Wilpinjong Coal Mines owned/ controlled land
- Crown land
- Private land
- Land dedicated to the DECCW estate
- Conservation and enhancement areas to be secured in the long-term
- Land proposed to be rehabilitated for agricultural purposes post mining
- Land proposed to be rehabilitated to Native vegetation post mining
- EEC revegetation and enhancement area
- Native vegetation revegetation and enhancement area on Properties 12,13,14 and 15
- Wildlife corridor linkages to enhance habitat connectivity
- Proposed long-term wildlife corridor linkages to enhance habitat connectivity

Area 2

Native vegetation and EEC conservation and enhancement area

Area 1

Native vegetation and EEC conservation and enhancement area

EEC enhancement area

Area 3

Native vegetation and EEC conservation and enhancement area

N

W E

S

0 1000 2000 3000 4000m

MOOLARBENCOAL

Stage 1 Biodiversirty Offset and Rehabilitation Strategy

Prepared by Pegasus Survey & Drafting

CAD FILE: 09253A.dwg

VEGETATION OFFSET AREAS

Moolarben Coal Operations
Landscape Management Plan
Ulan NSW

Figure **6**

3.5.3 Revegetation of Land – EEC and Native Vegetation

The basic requirements for successful seed propagation are viable seed, a clean, well drained growing medium, sufficient moisture and a suitable temperature and light environment. A combination of direct seeding and tube stock planting will be undertaken in the offset areas based on time and cost efficiencies for specific species. MCO will engage specialist nurseries to undertake the propagation of the tube stock plants. The nominated species list for tube stock material will be based on the required species list for revegetation programs.

Due to the relatively large size of proposed plantings a simple, low maintenance strategy has been developed. The revegetation works commenced in 2011 and at the end of August 2013 the percentage of the areas revegetated are:

- Condition 42 (b) conserve and enhance at least 2.6 hectares of regenerating White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community on Property 6 ("Dexter Mountain") = 112%.
- Condition 42 (c) revegetate disturbed land with at least 48 hectares of White Box Yellow Box Blakely's Red Gum endangered ecological community on Properties 6, 10, 12, 13, 14 and 15 ("Red Hills", "UG4", and "Dexter Mountain") = 96.9% (inclusive of natural regeneration).
- Condition 42 (d) revegetate at least 153 hectares of cleared land on the Properties 12, 13, 14 and 15 ("Red Hills") = 69.0% (inclusive of natural regeneration).

The finalisation of the works will be dependent on weather conditions and tube stock and seed availability.

The following strategy will be implemented for the revegetation works to be undertaken at MCO pending the success of initial trial plots.. If required, trials of alternative strategies will be undertaken to assess their feasibility prior to full implementation.

1. ***Weed Control***

Spray significant weeds in cleared areas at appropriate times. Care is needed to protect emerging natural regeneration.

2. ***Delineate and Peg Out Boundaries of Proposed Planting Areas***

Peg out planting areas to accommodate proposed tree planting.

3. ***Slashing***

Slash pegged out areas to reduce grass and weed competition. Wherever possible avoid slashing natural regeneration within these areas.

4. ***Deep Ripping***

Deep rip slashed areas. Each rip line should be ripped at least twice, once in each direction, to a minimum depth of 400 mm. Ripping should be undertaken at least 2 months ahead of planting and allowed to settle. Deep ripping will be avoided in areas with known Archaeological sites.

Note: Watering large number of proposed trees will be difficult. Hence the strategy of deep ripping early, allowing rip lines to settle, and planting into wet rip lines will be important to tree survival.

5. *Calculating Tree Numbers and Species*

Calculate the total number of trees together with individual species numbers required for each area. Species lists will include species needed for both the EEC community as well as general forest areas.

6. *Purchasing Trees*

Purchase trees to meet annual targets and timing. If possible, local provenance seed will be supplied to the selected nursery for subsequent tube stock propagation.

7. *Planting*

Planting should occur in the cooler months of April to June. During these months conditions are less stressful on planted seedlings and thus promote enhanced survival and reduced maintenance (particularly watering) costs.
It is proposed to plant tube stock into ripped ground at 5m x 4m spacing (500 trees per hectare). A slow release fertilizer pill will be placed under each root ball. Best practice planting techniques will be used to maximise survival.

A species planting pattern will be developed for each discrete area before commencement to establish species in natural and harmonious communities.

If conditions are dry trees will need to be individually watered immediately after planting. Temporary, low disturbance access tracks will be designed into the planting pattern to allow for watering vehicle access. A wetting agent should be included when watering to enhance watering effectiveness and duration.

8. *Maintenance and Monitoring*

Water and undertake weed control as required in first six months. Assess losses early the next year and replant if survival less than 80%. Undertake ongoing flora monitoring in accordance with **Section 3.25**.

3.6 MINE REHABILITATION

Rehabilitation will be undertaken in accordance with the Mining Operations Plan (MOP). Overburden dumps will be generally reshaped to less than 10 degrees slope with a maximum of 18 degrees consistent with DII guidelines. Where steep slopes are constructed, suitable erosion control structures such as contour banks and drop structures may be utilised to provide for stability.

Elements such as drainage paths, contour drains, ridgelines, and emplacements are shaped into undulating informal profiles in keeping with natural landforms of the surrounding environment and allowing for a greater diversity of plant species over time.

Surface preparation activities for rehabilitated areas will commence as soon as possible following the completion of mining activities. A general overview of the proposed surface preparation activities include:

- Prior to rehabilitation activities topsoils will be characterised to determine the type and application rate that may be required for the addition of soil ameliorants (e.g. gypsum, lime, fertiliser, biosolids etc.);
- Appropriate soil ameliorants will be applied for incorporation into the final shaped surface;
- Where direct tree seeding is planned, final shaped surfaces will be deep ripped parallel with the contour prior to the application of seed to provide for an adequate seed bed;
- Where pasture seeding is planned the surface will be harrow/tilled across the contour to provide for an adequate seed bed;
- Suitable erosion control measures (e.g. silt fences, mulches etc.) will be implemented to minimise soil loss from areas undergoing rehabilitation; and
- Where appropriate and practical, structures such as tree hollows, logs, small water ponds and rock may be incorporated into the final landform to augment the habitat value.

Rehabilitation activities will generally be undertaken in spring and autumn; however, opportunistic rehabilitation may be practised if areas become available for seeding or planting in summer and winter and weather conditions are favourable. After surface soil amelioration and surface preparation is completed for any given area, rehabilitation will commence as soon as practicable.

Woodland seed and tube stock supply will preferentially be of local provenance. Seed collected onsite will be incorporated into the rehabilitation mix or propagated to produce tube stock for planting. Seed and tube stock supplied from outside sources will be preferentially of Mid Western provenance or from an area within NSW of similar climatic conditions to the Ulan area.

As areas become available for rehabilitation, detailed plans, incorporating the above concepts, will be prepared prior to the rehabilitation of each area.

3.7 MINE REHABILITATION FOR BIODIVERSITY VALUE

Rehabilitation areas are those areas disturbed by mining operation which will be progressively rehabilitated to achieve specific post-mining landuse; biodiversity protection (OC1 and UG4) or agricultural use (OC2 and OC3). The environmental bunds in OC1 and OC2 will be managed as part of the rehabilitation activities for the respective open cuts and will not be managed as separate programs. Details on how MCO propose to meet the objectives of the Mine Rehabilitation in terms of biodiversity, together with information on assessment criteria and the associated monitoring program are provided in **Table 14**.

Table 14: Management of Mine Rehabilitation for Biodiversity

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
Management Goal - Progressive Mine Site Rehabilitation			
Creation of a safe, stable, adequately drained post-mining landform that is consistent with the local surrounding landscape within the operational area to minimise visual impacts.	Development and implementation of Vegetation Clearance Protocol – further details are provided in **Section 3.10.**	All works undertaken in accordance with Mining Operations Plan and MCO Procedures.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity and abundance (flora and fauna) and habitat creation.
	Rehabilitation activities will take into account seasonal factors and will be scheduled, where possible, prior to the expected onset of seasonal rains.		
	Site-specific trials to examine rehabilitation techniques will be considered where there is value in understanding the relationship between species selection, soil type, and herbicide or fertiliser requirements.		
	Access to rehabilitated areas will be restricted to prevent the uncontrolled entry of livestock and to minimise vehicular traffic during the establishment phase.		

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
Rehabilitation of the OC1 footprint using native vegetation to create Box Gum Woodlands and Sedimentary Ironbark Forests with stands of *Allocasurina.*	Use of local provenance seed as the basis of the rehabilitation program – further details are provided in **Section 3.15**.	The midslopes of the post mining lands located in the northern areas of OC1 are rehabilitated to a mosaic of Box Gum Woodland and Sedimentary Ironbark Forests with stands of *Allocasurina*.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity and abundance (flora and fauna) and habitat creation in keeping with that of the vegetation association.
Rehabilitation of the OC1 footprint using native vegetation to create Box Gum Woodlands and Sedimentary Ironbark Forests with stands of *Allocasurina*	Rehabilitation works would initially rely on local pioneer species including wattles and grasses that are known to occupy disturbed environments throughout the project area.	Rehabilitation programs include the use of native pioneer species.	Monitoring includes assessment of the density and distribution of pioneer species.
	Successive plantings of the targeted vegetation communities.	Rehabilitation techniques include the use of identified plant species from the vegetation community.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity and abundance (flora and fauna) and habitat creation in keeping with that of the vegetation community.
	The rehabilitation mosaic would contain areas of relatively dense tree and/or shrub cover providing good shelter habitat, and some areas of open unimproved natural grassland with only occasional scattered trees and logs, to provide preferred foraging habitat for various threatened and declining woodland species (predominantly birds).	The rehabilitation areas contain a range of tree canopy and grass cover with associated habitat.	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity and abundance (flora and fauna) and habitat creation in keeping with that of the vegetation community.
	The final mosaic would also include several	Stands of *Allocasurina* sp. have	Monitoring including assessment of

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
	large stands of *Allocasuarina* sp, to replace cleared stands known to be of foraging value for the Glossy Black Cockatoo.	been established across the project area.	the areas rehabilitated to *Allocasurina* species. Monitoring in the area rehabilitated to *Allocasurina* sp includes assessment of the presence of the Glossy Black Cockatoo.
	Allocasurina spp. would be used as an understorey plant in many rehabilitated woodland areas.	The rehabilitation mix will include *Allocasurina* species as a key understorey species.	Monitoring includes assessment of the distribution / density of *Allocasurina* species in the rehabilitated woodland areas.
Rehabilitation of the OC1 footprint using native vegetation to create Box Gum Woodlands and Sedimentary Ironbark Forests and stands of *Allocasurina*	Additional permanent water storages would be created on the lower slopes within the OC1 area. These would provide additional water resources for fauna in the area, a resource likely to be a limiting factor of habitat value in the region.	The post disturbance landscape will include permanent water storage on the lower slopes of OC1.	GIS data is to be collected on the location of the permanent water storages.
Rehabilitation of the OC1 footprint using native vegetation to create Box Gum Woodlands	Habitat features such as large hollows will be salvaged during vegetation clearance activities and utilised in the post mining landscape, where practical	Habitat features such as hollow logs and large woody debris are used in the rehabilitation program.	The presence of salvaged habitat features (large hollows) and evidence of habitation will be included within monitoring activities.
	Retention of bush rock	Habitat features such as bush rock / rock from overburden are used in the rehabilitation program	Monitoring includes GIS data on the location of the rock piles. Monitoring data is collected on the number of rock piles in post mining landscapes
	Cleared lands mined within the OC1 footprint will also be rehabilitated in a	Soil and contour maps of the northern OC1 area would be	Monitoring will include a determination of the native vegetation

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
	manner consistent with the vegetated lands impacted by the development resulting in a localised long-term increase of native vegetation cover	used to determine an appropriate boundary between the Sedimentary Ironbark Forests of the ridgeline, and the Box Woodlands of the mid-slopes	cover to demonstrate that the area increases over time. A comparison of area should be made between monitoring periods.
Lands adjoining the northern part of the OC2 area and haul road linkage with OC1 that are under the control of MCO will be revegetated to enhance vegetation cover and connectivity	These lands will be revegetated with WBYBBRGW species	Revegetation techniques include the use of identified plant species from the WBYBBRGW EEC.	Monitoring indicates the presence and successful establishment of WBYBBRGW species.
Enhancement of Grassy White Box Woodland on basalt soils, in close proximity to Carrs Gap, that are located within the MCP DA area	Weed management, exclusion of grazing and tree plantings	Revegetation techniques include the use of identified plant species from the WBYBBRGW EEC.	Monitoring examines the presence of weed species, indications of whether there is evidence of cattle within the area, and the successful establishment of tree species.
	Strategic implementation of bushfire management – further details are provided in **Section 3.23**		
Management Goal - Riparian Vegetation establishment and enhancement			
To improve the ecological integrity of the aquatic habitats through revegetation using native species	Access to areas restricted in turn reducing the risk of sedimentation and erosion.	Water quality maintained in accordance with project guidelines	Monitoring the electrical conductivity and salinity of the waters.
	Native species used within revegetation as per **Section 3.14.3**of the LMP	Revegetation activities undertaken are consistent with **Section 3.5.3** of the LMP. Species used within revegetation are native and	Monitoring program includes identification of species used within revegetated riparian vegetation communities.

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
		endemic to local riparian vegetation communities.	
The riparian zone of the Moolarben Creek to the east of OC3 will be revegetated to improve stream health and enhance the Alluvial Apple Forest	Access to areas restricted in turn reducing the risk of sedimentation and erosion.	Water quality maintained in accordance with project guidelines	Monitoring the electrical conductivity and salinity of the waters.
	Retaining and protecting the existing native vegetation wherever practical, this may include exclusion of livestock.	Enhanced area of riparian vegetation as a function of restriction of access by stock.	Monitoring program includes a component to assess the impact of stock on riparian areas.
	Utilising species that can tolerate naturally high salinity levels.	Revegetation works include the use of saline tolerant species. Utilisation in the revegetation program of species derived from the Riparian Alluvial Apple Forest.	Revegetation activities undertaken that are consistent with **Section 3.5.3** of the LMP. Riparian species are consistent with species identified within Analogue sites. Saline tolerant species are included within rehabilitated sites where appropriate.
	Utilising species that increase the ecosystems network connectivity, particularly for woodland birds.	Revegetation works include species which produce habitat / roosting / nesting components suitable for woodland birds e.g. woody debris, flaky bark, range of seasonality in terms of flowering.	Monitoring includes component on the survival of tubestock which have been used in revegetation programs. Monitoring include assessment of habitat augmentation and presence of woodland birds

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
	Utilising species that provide supplementary habitat for native species (including emergent rush and reed species).	Revegetation works includes the use of emergent rush and reeds.	Monitoring includes component on the survival of emergent rushes and reeds which have been used in revegetation programs.
	Controlling and removing environmental and declared weed species, with due consideration to not compromising bank stability in the process	Weed control undertaken with due consideration of risk of bank erosion and destabilisation.	Monitoring to include consideration of erosion and bank stability aligned to weed control works.
The riparian zone of the Bora Creek will be managed to improve stream health	Retaining and protecting the existing native riparian vegetation wherever practical, on land managed by MCO, this may include exclusion of livestock	Enhanced area of riparian vegetation as a function of restriction of access by stock.	Monitoring program includes a component to assess the impact of stock on riparian areas.
	Utilising species that increase the ecosystems network connectivity, particularly for woodland birds.	Revegetation works include species which produce habitat / roosting / nesting components suitable for woodland birds e.g. woody debris, flaky bark, range of seasonality in terms of flowering.	Monitoring includes component on the survival of tubestock which have been used in revegetation programs. Monitoring include assessment of habitat augmentation.
	Utilising species that provide supplementary habitat for native species (including emergent rush and reed species).	Revegetation works includes the use of emergent rush and reeds.	Monitoring includes component on the survival of emergent rushes and reeds which have been used in revegetation programs.
	Controlling and removing environmental and declared weed species, with due consideration to not compromising bank	Weed control undertaken with due consideration of risk of bank erosion and	Monitoring to include consideration of erosion and bank stability aligned to weed control works.

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
	stability in the process	destabilisation.	
Management Goal - Land that is rehabilitated post mining for biodiversity value will be conserved by an appropriate mechanism			
Mined land will be rehabilitated to a comparable standard as the relative analogue sites and completion criteria	Rehabilitation planning and implementation as per the Mining Operations Plan, with reference to the monitoring program	Mined land with designated biodiversity outcome has been rehabilitated as to be comparable to the relative analogue sites and completion criteria	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity and abundance (flora and fauna) and habitat creation.
	Optimising the use of local growing media - further details are provided in **Section 3.13**	A suitable topsoil substitute, weathered material, biosolids or a combination of materials has been used to provide a suitable growth media enabling sustainable plant growth.	Monitoring to include consideration of growing media including assessment of: • Soil pH • Dispersion capability • Leaf litter • Data collection on zones of various growing media
		No excessive areas of bare soil (e.g from crusting or compaction) that may negatively affect plant growth or germination	
		A litter layer and decomposition is evident on the soil surface	
		pH levels are within the range required to allow plant growth for native species (5.0 – 8.5)	

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
Management Goal - Minimisation of damage resulting from unauthorised vehicle access			
Minimise site access by vehicles which can result in the compaction of soil (which can reduce the infiltration of water into the soil and restrict root growth, and consequently reduce natural regeneration), the spread of weeds and disturbance to vegetation	In order to reduce the degree of disturbance to the rehabilitation areas and offset areas, access to these areas will be restricted to authorised personnel only.	Vehicle access has been restricted to defined access pathways for use by authorised vehicles.	Monitoring to include assessment of vehicle access
Management Goal - Minimal loss of native vegetation or habitats for works associated with the operation of Underground No. 4			
Subsidence impacts associated with UG4 are relatively minor	All works will be carried out in accordance with the Subsidence Management Plan (which is to be prepared in accordance with Condition 27 of the Consent (05_0117)) prior carrying out any underground mining operations	Criteria will be developed in the Subsidence Management Plan	Monitoring undertaken in accordance with the Subsidence Management Plan and to include impact of surface subsidence on surface features, including flora and fauna.
Management Goal - Land management activities associated with the working of Underground No. 4 would be undertaken as part of the projects 'Enhancement' strategies			
Portions of the lands located above UG4 will be protected with an appropriate conservation mechanism for the long-term security of this ecosystem	Appropriate protection mechanisms (e.g. CA) will be used for the long-term security of portions of the lands aligned to UG4	Appropriate conservation mechanism in place for lands aligned to UG4.	As per liaison with relevant agencies
Management Goal - Preservation of existing water resources			
Clean and dirty water are kept as separate entities across the project	Surface water is managed in accordance with the Water Management Plan	Surface water is assessed in accordance with the Water	Surface water is monitored in accordance with the Water

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
area.		Management Plan	Management Plan
Management Goal - Ongoing control and management of weed and feral animal species.			
Promote biodiversity through weed and feral animal control programs	Management and control of noxious and environmental weeds and feral animals using appropriate means prior to, during and post the rehabilitation program - further details are provided in **Section 3.19** and **3.20**	Weeds and feral animals are managed in accordance with relevant legislation	Monitoring of areas where weed and feral animal control has been implemented. All monitoring data recorded using GIS as a basis for future decisions making.

3.8 MINE REHABILITATION FOR AGRICULTURE

Rehabilitation areas are those areas disturbed by mining operation which will be progressively rehabilitated to achieve specific post-mining landuse; agricultural use (OC2 and OC3) or biodiversity protection (OC1 and UG4). The environmental bunds in OC1 and OC2 will be managed as part of the rehabilitation activities for the respective open cuts and will not be managed as separate programs. Details on how MCO propose to meet the objectives of the Mine Rehabilitation in terms of agriculture, together with information on assessment criteria and the associated monitoring program are provided in **Table 15**.

Table 15: Management of Rehabilitation for Agriculture

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
Management Goal - Sustainable agricultural land use on lands impacted by OC2 and OC3			
Rehabilitation of the OC2 and OC3 footprints principally for agricultural outcomes.	Rehabilitation program in these areas is aligned to the use of pasture species mix which will have a carrying capacity aligned to surrounding lands.	Rehabilitation of the pasture areas will be conducted in consideration of guidelines such as those presented in the *Rehabilitation of Open Cut Coal Mines using Native Grasses: Management*	Monitoring to assess: • Ground cover • Pasture species mix • Presence/ absence of

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
		Guidelines (DECC, 2003) and use species which are commercially available	erosion • Carrying capacity • Soil nutrient in terms of fertiliser regimes
Management Goal - Weed and Feral Animal Control			
Promote biodiversity through weed and feral animal control programs	Management and control of noxious and environmental weeds and feral animals using appropriate means prior to, during and post the rehabilitation program - further details are provided in **Section 3.19** and **3.20**	Weeds and feral animals are managed in accordance with relevant legislation	Monitoring to assess: • Presence/ absence of weed species • Presence of impact / damage associated with feral animals • Monitoring of areas where weed and feral animal control has been implemented. • All monitoring data recorded using GIS as a basis for future decisions making
Management Goal - Encourage natural regeneration aligned to native grasses in areas of pasture			
Creation of a safe, stable, adequately drained post-mining landform that is consistent with the local surrounding landscape within the operational area to minimise visual impacts	Implementation of appropriate land management practices such as strategic grazing/exclusion of livestock, bushfire management nutrient management. Land to be used for livestock grazing will be fenced to exclude livestock from areas being managed to encourage for natural regeneration.	All works undertaken in accordance with Mining Operations Plan and MCO Procedures	Monitoring of defined lands based on assessment of criteria aligned to landscape function, species diversity and abundance (flora and fauna).

Objectives and Performance Targets	Means of Achieving Objectives	Assessment Criteria	Monitoring Program
	Fertiliser application will be limited in remnant vegetation patches controlling the perennial grass biomass to encourage forbs and herbs. These grasses can easily out-compete smaller native plants, so management to reduce cover/biomass can release other species from the soil seed bank		

3.9 ENVIRONMENTAL BUNDS

MCO will establish environmental bunds on the western side of Open Cut 1 and Open Cut 2. The rehabilitation of these environmental bunds will be incorporated into the rehabilitation of the respective open cuts. Refer to **Sections 3.7** and **3.8** for more details on how the environmental bunds will be managed.

3.10 VEGETATION CLEARANCE PROTOCOL

A Vegetation Clearance Protocol will be implemented to minimise impacts on flora and fauna during clearing of vegetated areas for mining and related activities. The key components of this protocol are outlined below and include:

- delineation of areas to be cleared of remnant vegetation;
- pre-clearance surveys;
- managing impacts on fauna; and
- vegetation clearance procedures.

Delineation of areas to be cleared of remnant vegetation will be undertaken to facilitate the pre-clearance survey and clearance process. Vegetation and other features (e.g. archaeological sites, National Parks) adjoining the proposed clearance areas will be clearly marked to prevent accidental damage during vegetation clearance activities.

Prior to any vegetation clearance, a pre-clearance survey will be undertaken to identify the potential habitat features located within proposed disturbance areas. The pre-clearance surveys will be undertaken by an appropriately trained person. The pre-clearance surveys will also identify any weed infestations that may need treatment prior to clearing activities commencing.

Trees containing features with the potential to provide habitat resources for birds, bats and/or arboreal mammals will be retained wherever practicable. Following the preliminary identification of potential habitat trees, a secondary habitat assessment will be undertaken to determine appropriate fauna management strategies.

Where practical and feasible, habitat features such as large hollows identified during the pre-clearance surveys will be salvaged and relocated to existing areas of remnant vegetation or rehabilitation areas.

In the event that any threatened flora or fauna species are observed during the habitat assessment for the pre-clearance surveys, the Fauna Management Strategies (**Section 3.11**) will be initiated.

In summary, prior to clearing of any vegetation on site, the following measures will be implemented:

- the area to be cleared will be clearly delineated to mitigate against unapproved clearing of vegetation;
- a pre-clearing inspection will be undertaken by an appropriately trained person;

- trees containing features with the potential to provide habitat resources for birds, bats and/or arboreal mammals will be clearly marked as habitat trees;
- a Ground Disturbance Permit will be completed and approved by the Environment and Community Relations Manager or Environment and Community Relations Superintendent prior to clearing activities commencing;
- to encourage fauna to relocate from habitat trees, non-habitat vegetation will be cleared first with the habitat trees left standing in open ground;
- habitat trees will be gently felled under the supervision of the environmental department and left undisturbed for 24 hours to enable fauna to relocate;
- where required, if fauna are still present after 24 hours they will be relocated to adjacent undisturbed habitat;
- where practical and feasible, features identified for use in rehabilitation programs (e.g. hollow branches) will be salvaged, stockpiled and relocated to rehabilitation areas; and
- non-habitat trees identified for clearing will be classified as suitable for firewood, commercial milling, in situ mulching/shearing or unsuitable to process.

3.11 MANAGING IMPACTS ON FAUNA

Fauna management strategies have been developed to minimise impacts of the operation on fauna. The practicality of implementing each strategy will be dependent on the characteristics of the habitat tree in question and will be determined by the MCO Environment and Community Relations Manager (or delegate).

Management strategies will include threat abatement measures, capture and release, relocation and provision of habitat resources. The management strategies will be determined on a case-by-case basis. Some examples of possible management strategies are provided below. Where required, licences for the implementation of fauna management strategies will be obtained in consultation with the OEH.

3.11.1 Threat Abatement

Threat abatement is the implementation of management strategies at the site to alleviate threatening processes. Actions may include the modification of disturbance areas, the scheduling of vegetation clearance activities to occur at a particular time (e.g. when the hollow is not being utilised as a nesting/roosting resource by the threatened fauna species).

3.11.2 Capture and Release

This option involves the capture and release of threatened fauna into proximal suitable habitat. Where threatened fauna is observed using a particular habitat feature, an attempt will be made utilising accepted trapping techniques to capture the particular animal for the purpose of later release in suitable habitat.

3.11.3 Relocation

This option involves the relocation of roosting/nesting resources to proximal suitable habitat. For example, the Yellow-bellied Sheathtail Bat has been found to utilise a network of roosts, rather than being fixed to one roost. Hence, there is potential to relocate known roosts/nests to nearby suitable vegetation, when the roost/nest is unoccupied by the threatened species.

3.12 SURFACE WATER MANAGEMENT AND EROSION CONTROL

Installation of effective drainage and surface water control will be an important aspect of site rehabilitation. Effective surface water management is essential for reducing erosion and creating a stable self draining landform. The design of surface water management structures and controls in the final landform is discussed in the MCO Water Management Plan (WMP).

3.13 TOPSOIL MANAGEMENT

Topsoil stripping and stockpiling or direct re-spreading of the soil resource will be undertaken in a progressive manner following the mine sequence. Details on the staged management of topsoil are provided in **Table 16**.

Where practicable, the following management practices will be implemented to improve the available soil resource for use in rehabilitation:

- Soil types will be blended to improve the overall quality and quantity of the existing soil resource;
- Vehicular traffic on soils to be stripped and on soils sensitive to structural degradation will be minimised;
- Loaders and trucks will be used during stripping rather than scrapers to minimise structural degradation of the soil;
- Soil stockpiles will be kept as low as possible with large surface area;
- Soil stockpiles will be managed to reduce weed growth;
- Long-term soil stockpiles will be located outside of mine disturbance areas;
- Long-term soil stockpiles will be ripped, harrowed and revegetated with grass species;
- Soil stockpiles will be assessed for weeds, scalped or removed if necessary and then ripped prior to reinstatement;
- Application of appropriate (type and quantity) soil amendments and fertilisers (e.g., sodic and dispersive soils will be treated with gypsum or lime, as required, where they are to be used on exposed surface areas); and

The application of these measures will assist preservation and improve overall soil health; reduce soil loss and weed growth; and ultimately assist in re-establishing native vegetation on rehabilitation areas.

Topsoil placement in the offset areas is expected to be minimal and limited to erosion repair works.

Table 16: Soil Resource Management Strategies

Prior to Soil Stripping	During Soil Stripping and Stockpiling	Stockpiled Soil Awaiting use in Rehabilitation Works	During the Rehabilitation Program
• Quantification of soil resources. • Characterisation of the suitability of soil resources for rehabilitation works. • Subsoil material that may potentially enhance the revegetation works would be investigated, with suitable materials to be stockpiled and used in the revegetation works. One such subsoil material that may be of importance for re-establishing WBYBBRGWs includes the tuffaceous claystones contained within the coal seam profile • Formulation of stripping and stockpiling guidelines including the nomination of appropriate depths, scheduling, location of areas to be stripped and stockpile locations.	• Minimisation of vegetation clearance. • Selective stockpiling of soil according to soil type • Stockpiling of soils in a manner that does not compromise the long-term viability of the soil resource. • Soil stockpiles will be preferably located outside of proposed mining areas. • Vehicular traffic will be kept to a minimum on the soils to be stripped. Traffic will be excluded from soils that are sensitive to structural degradation. • Loaders and trucks will be preferentially used over scrapers to minimise structural degradation. • Construction of stockpiles with a “rough” surface	• Implementation of measures to manage long-term viability of soil resources and manage soil salinity. • Fertilise and seed stockpiles which will be inactive for extended periods to maintain soil structure, organic matter and microbial activity. • Where necessary, install silt fences around stockpiles to control potential loss of stockpiled soil through erosion prior to vegetative stabilisation. • Stockpiles will be ripped to establish aerobic conditions, prior to reapplication of stockpiled soil for rehabilitation. • Where necessary, an appropriate soil ameliorant will be applied at an appropriate rate to dispersive soil stockpiles. • Implement appropriate weed control strategies particularly for	• Topsoil conditioning involving the addition of lime, gypsum or fertiliser will be used where required. • On completion of landform contouring, topsoiling and erosion and sediment control works, a vegetative cover will be applied as soon as practicable. Depending on the proposed post-mining landuse, this will involve direct seeding of selected shrub, grass and tree species. • Implement appropriate weed control strategies particularly for any noxious weeds. Immediate revegetation will provide vegetative competition to assist with control of undesirable plant species.

	condition to reduce erosion hazard, improve drainage and promote revegetation. • Stockpiles will be generally no more than 3 meters in height in order to minimise problems with anaerobic conditions.	any noxious weeds. Immediate revegetation will provide vegetative competition to assist with control of undesirable plant species.	

3.14 SPECIES SELECTION

The success of any revegetation and rehabilitation program is dependent on knowing which species can be established from seed as against those that will recolonise from topsoil, those suitable for transplanting and / or the utilisation of tube stock or semi advanced plant material which has been grown from sexual or asexual means in a specialist nursery. The recommended species lists have been compiled with consideration to the following:

- The dominant species of each vegetation community (as described in **Section 2.4**);
- Collation of local and anecdotal knowledge;
- Knowledge of those species which can be introduced from alternate revegetation techniques to direct seed;
- Knowledge of species which are difficult to propagate, germinate and establish;
- Species that have features that would enable them to recolonise from topsoil seed load;
- Habitat enhancement aligned to the requirements of key fauna, including threatened fauna which may occur during mass flowering/fruiting events such as Glossy Black Cockatoo, Regent Honeyeater, Swift Parrot and Squirrel Glider;
- Climate (e.g., water availability and frosts);
- Landform (e.g., slopes, floodplains and creeks); and
- Soil availability and nutrition.

This information has been underpinned by current knowledge relating to the propagation requirements of these species and how they may be reintroduced to the area e.g. from topsoil seed bank, direct seeding, brush material planted as tube stock and / or transplanted.

3.14.1 Offset Areas

The recommended species lists aim to incorporate the dominant species of each vegetation community. The extent of each vegetation community across mine lease prior to agricultural disturbance is not known. Therefore the recommended species lists provided in **Table 17** aims to incorporate the dominant species of the prominent vegetation complexes of MCO and the requirements of the Development Consent for the offset areas. The exact species mix will be included in the final rehabilitation design plan for each area.

Table 17: Recommended Species List for Rehabilitation Areas for Biodiversity Value and Offset Areas

Species Name	Common Name
Angophora floribunda	Rough-barked Apple
Eucalyptus albens	White Box
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus crebra	Narrow-leaved Ironbark

Species Name	Common Name
Eucalyptus dawsonii	Slaty Gum
Eucalyptus fibrosa	Broad-leaved Ironbark
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus moluccana	Grey Box
Eucalyptus punctata	Grey Gum
Eucalyptus rossii	Inland Scribbly Gum
Acacia leucolobia	Box-leaved Wattle
Acacia linearifolia	Narrow-leaved wattle
Allocasuarina gymnanthera	She-oak
Daviesia acicularis	Spiny Bitter-pea
Dodonaea viscosa ssp cuneata	Hop Bush
Dianella revoluta	Flax Lilly
Lomandra confertifolia	Mat-rush
Pomax umbellata	Pomax
Pultenaea microphylla	Spreading Bush-pea
Aristida vagans	Three-awned Speargrass
Arundinella nepalensis	Reedgrass
Austrodanthonia racemosa	Wallaby Grass
Austrostipa scabra	Speargrass
Dichelachne micrantha	Short-haired Plumed Grass
Microlaena stipoides	Weeping Meadow Grass

3.14.2 Rehabilitation

The final landform and post-mining land use objectives will dictate the composition and structure of species to be established for rehabilitation. The re-establishment of ecological function conducive to the development of Box Woodland EEC will be a key feature of the rehabilitation of OC1, with mid-slopes to be revegetated to include primarily WBYBBRGW associations. Soil and contour maps would be used to determine an appropriate boundary between the Sedimentary Ironbark Forests of the ridgelines and the Box Woodlands of the mid-slopes. The Box Woodland mosaic will contain some areas of relatively dense tree and/or shrub cover, providing good shelter habitat and some areas of natural grassland. Species will be chosen to improve faunal biodiversity and habitat (**Table 17**).

Rehabilitation of areas for biodiversity value will be seeded with a combination of native perennial grasses, shrubs and woodland species consistent with those species found in the local area. Species selection will be designed to promote the development of forest and woodland with structured understorey, mid-storey and tree canopy coverage. This will increase overall biodiversity values and promote survival of these vegetation types in the post-mining landscape.

Rehabilitation of areas for agricultural value should be seeded with the recommended grasses and vegetation that permits livestock grazing as per **Table 18**. The exact species mix will be included in the final rehabilitation design plan for each area.

Table 18: Recommended Species List for Rehabilitation Areas Returning to a Predominately Agricultural Land Use

Species Name	Common Name
Autumn Sowing	
Lolium rigidum	Wimmera Ryegrass
Setaria sphacelata	Setaria
	Kikuyu
	Green Panic
Phalaris aquatica	Phalaris
	Sephi Medic
	Lucerne
	Subterranean Clover
Spring Sowing	
	Couch
	Kikuyu
	Lucerne

3.14.3 Riparian

Rehabilitation measures will be incorporated into the post-mining creek design to increase habitat and diversity, minimise erosion, sedimentation and instability. This will include planting of native perennial grasses and deep-rooted woodland species (such as Box and Redgum) on upper and mid banks. The use of native endemic riparian species will increase groundcover and provide cohesion of the banks. **Table 19** lists a selection of species that are proposed for use in revegetating the creeks. Where necessary, these will be supplemented with other groundcover (such as stoloniferous grasses, rushes and / or reeds) to protect creek beds against erosion. The exact species mix will be included in the final rehabilitation design plan for each area.

Table 19: Recommended Species List for Riparian Areas

Location	Species Name	Common Name
Upper banks	*Eucalyptus blakelyi*	Blakely's Red Gum
	Eucalyptus melliodora	Yellow Box
	Eucalyptus moluccana	Grey Box
	Angophora floribunda	Rough-barked Apple
	Acacia spectabilis	Mudgee Wattle

Location	Species Name	Common Name
	Daviesia genistifolia	Broom Bitter Pea
	Themeda australis	Kangaroo Grass
Mid banks	*Melaleuca thymifolia*	Thyme Honey Myrtle – clayey soils
	Leptospermum polygalifolium	Tantoon – sandy soils
	Dichelachne micrantha	Short-haired Plumed Grass
	Lomandra confertifolia	Mat-rush
	Themeda australis	Kangaroo Grass
	Eucalyptus blakelyi	Blakely's Red Gum
	Angophora floribunda	Rough-barked Apple
Lower Banks	*Arundinella nepalensis*	Reedgrass
	Melaleuca thymifolia	Thyme Honey Myrtle
	Lomandra confertifolia	Mat-rush

3.15 SEED COLLECTION AND PROPAGATION

The rehabilitation of disturbed areas will, where practical be based on the use of local provenance seed. Seed collection and propagation activities will be undertaken in accordance with the requirements of the Florabank guidelines (2000), with the additional consideration of:

- examination of trees for their provision of seed during the pre-clearance survey;
- collation of relevant information on target species;
- progressive collection of native seed to augment revegetation resources;
- strategically timed and cost effective collection program aligned to the clearing of vegetation associated with the mining operations – a seed collection calendar;
- collection of fruit directly from the plant into collection bags for transfer to drying rooms;
- maintenance of a seed inventory which will record the amount of seed collected, species type and treatment and propagation specifications;
- The consent of the land owner and/or manager must be obtained prior to the work commencing. Maintain all necessary licensing requirements where seed is being collected on lands extraneous to the mining lease; and
- An application from the NSW OEH (for TSC Act listed species) and / or Commonwealth Department of Sustainability, Environment, Water, Population and Communities (for EPBC Act listed species) must be submitted and approved prior to works commencing on lands outside of the approved project area. The seed contractor must be able to provide copies of this documentation prior to any works commencing.

3.16 REHABILITATION TECHNIQUES

Various techniques exist for seeding and planting of rehabilitation areas and these have been investigated during the early years of rehabilitation and vegetation enhancement at MCO with the best techniques being carried through for use at MCO. Consideration is given to site conditions, including soil type and condition, landform, time of year, climate, water availability and vegetation community establishment outcomes and also the best methods of rehabilitation application.

MCO has developed and implemented a Rehabilitation Procedure which is provided to subcontractors engaged to carry out rehabilitation works. Surface preparation techniques, planting techniques, fertiliser and water application rates are developed in consultation with a rehabilitation expert or agronomist. This procedure is regularly updated to include the findings from rehabilitation trials and monitoring.

3.17 REHABILITATION MAINTENANCE STRATEGY

Maintenance of rehabilitation areas is recognised as being essential in creating a sustainable post-mining ecosystem. Rehabilitation areas at the juvenile stage are prone to invasion of weeds and pests and self-sustaining conditions may take many years to reach.

Maintenance of rehabilitation areas will focus on re-establishing natural processes including surface stability, cycling of nutrients and plant lifecycles. This may require:

- Maintenance to eroded areas and creek beds;
- Application of fertiliser or other soil amendments;
- Control of seed predation;
- Watering of plants, especially in the establishment phase;
- Control of pests and weeds;
- Control of feral and native animals; and
- Replanting failed or unsatisfactorily revegetated areas.
- Fire management (restriction of fire through juvenile communities).

Intensive maintenance will be required during the establishment phase with input efforts tapering as plant and ecological communities become established. Some maintenance actions will need to be continued for the duration of the rehabilitation phase, such as controlling weeds, pests and native grazers (e.g., kangaroos), as well as fire management (Nichols, 2005). Climate and rainfall will also play an important role in the amount of maintenance required. For example, watering may be required during drought and in summer months when rainfall is low. Drought can significantly impact both the success of initial establishment and successional trends within rehabilitated areas (Nichols, 2005), while intense storm events can lead to erosion and soil loss.

Monitoring of rehabilitation (**Section 3.25**) areas will identify locations where targeted maintenance and management actions are required.

3.18 HABITAT AUGMENTATION

The following shall be used to install and create the habitat resources:

- Stag trees – hollow bearing timber for vertical placement within rehabilitation for avian species or arboreal mammals, and bark retained timber for arboreal microbats.
- Coarse Woody Debris – horizontal placement of hollow logs or small piles of timber and rocks creating cavities for habitat by small ground dwelling mammals and reptiles placed for inter connectivity across the landscape. Habitat trees salvaged from areas of cleared vegetation can be used as stag trees or coarse woody debris.
- Drainage depression (frog ponds) creation providing riparian and aquatic habitat for vegetation, amphibian and water fowl placed for connectivity across the landscape.

The utilisation and maintenance of the nesting boxes which have been installed on site shall be assessed as part of the monitoring program. The monitoring program (preferably GIS based) will report location of nesting boxes, data on usage (including for occupation by feral species e.g. bees, starlings) and maintenance requirements. Action required in situations of feral occupation shall be assessed on a case by case basis.

3.19 WEED CONTROL

A weed control program will be implemented to limit the spread and colonisation of both noxious and environmental weeds. The weed control program will consist of:

- regular inspections of MCO owned lands to identify areas requiring the implementation of weed management measures;
- consultation with neighbouring land owners and relevant government stakeholders regarding regional weed management strategies;
- implementation of appropriate weed management measures which may include mechanical removal, application of approved herbicides and biological control;
- control of noxious weeds identified on MCO owned land in accordance with the relevant Department of Industry and Investment (DII) control category and the relevant regional weed management plan;
- regular inspections and maintenance of topsoil stockpiles;
- identification of weed infestations adjacent to or within the proposed disturbance area during preclearance surveys;
- follow-up inspections to assess the effectiveness of the weed management measures implemented and the requirement for any additional management measures; and
- minimising the potential for establishment of new weeds on offset areas by minimising the transport of weed species to and from offset areas (e.g. limiting vehicle access and minimising stock access).

Introduced plants are of concern as they have the potential to out-compete native species, to alter habitat and affect land use (agricultural or recreational). Under the NSW, Noxious Weeds Act 1993, MCO has a statutory responsibility to prevent the spread of noxious weeds. Further, there are also a

number of weed species (particularly introduced perennial grasses) which are not listed under the Noxious Weeds Act but are a significant concern in regard to the long-term viability of the Box Gum Woodland EEC and have been listed as a Key Threatening Process (DECCW 2010). The consideration of these species will be incorporated into any weed management and control program.

All work is to be completed in accordance with the *Pesticides Act 1999*.

3.20 PEST ANIMAL CONTROL

Pest animal control will be undertaken in consultation with the Central North Livestock Health and Pest Authority in accordance with the requirements of the Rural Lands Protection Act, 1998 and surrounding landowners, as required. Activities undertaken at MCO may include but not be limited to:

- Design and implementation of a Vertebrate Pest Strategy focusing on those species which are known to impact the native flora and fauna. Key target species will include Feral Cat, Wild Dog, Feral Pig, Feral Goat, Wild Rabbit, Red Fox, Fallow Deer and Feral Birds;
- Monitoring the activity of feral animals at MCO using a range of measures including opportune sightings, track counts on sand-pads and motion sensor cameras. This will be incorporated in the flora and fauna monitoring programs undertaken in Autumn and Spring, where possible;
- Using a range of appropriate pest control measures to minimise collateral damage to native animals (e.g. the destruction of rabbit burrows, feral cat and goat trapping and baiting of foxes and wild dogs and wild pigs); and
- Follow-up inspections to assess the effectiveness of control measures implemented and the requirement for any additional control measures. This will be incorporated in the flora and fauna monitoring programs undertaken in Autumn and Spring, where possible.

3.21 FENCING

An effective fence is one which is high enough to prevent animals bearing down on it, flexible enough with a mesh of wires to prevent them putting their heads through it, and close enough to the ground to prevent them pushing underneath. Fences shall be maintained around all offset areas to manage stock and unauthorised human access.

However, fences, particularly barbed wire fences, are one of the major obstacles to fauna movement. Fences erected across habitat areas and corridors create physical barriers to fauna movement and therefore have the potential to disrupt the feeding, migration, breeding and social patterns of fauna within that area. More than 75 wildlife species have been identified in Australia as occasional or regular victims of barbed wire fences, especially nocturnal animals such as bats, gliders and owls. For all new or replaced fencing MCO will implement fauna – friendly fencing design and maintenance, which includes (Redlands Council, 2002):

- No barbed wire, plain wire is preferable;
- (a) 50cm gap between ground level and the first rail or stand, or

  (b) A series of 30cm gaps between the rails or strands (the first gap should be no higher

than 15cm above ground level), or

(c) Box wire mesh (with squares no smaller than 15cm) and fence no higher than 1.2m.

- Regular inspection and maintenance (annually). Maintenance requirements are minimised if the fence is meticulously constructed with high quality materials.

3.22 RESTRICTIONS ON AREA ACCESS

Damage by vehicles can result in the compaction of soil (which can reduce the infiltration of water into the soil and restrict root growth, and consequently reduce natural regeneration), the spread of weeds and disturbance to vegetation. In order to reduce the degree of disturbance to the rehabilitation areas and offset areas measures will be put in place to limit access to these areas by authorised personnel only.

3.23 BUSHFIRE MANAGEMENT

The aim of fire management from a biodiversity perspective is to manage fire in a manner that prevents loss or degradation of biodiversity over time. To achieve this, the following ecological principles will be applied:

- Minimum and maximum inter-fire periods to provide species and communities with an adequate inter-fire period to regenerate and to not compromise biodiversity through removing the regenerative stimulus provided by fire. For the remnant native vegetation communities of MCO decline in ecosystem function is expected if successive fires occur less than eight years apart. Further, decline in ecosystem function is predicted if no fire occurs for more than 40 years (DECC, 2008). Therefore, a regime which varies fire timing within these thresholds across the communities' distribution is desirable.
- Identification of habitat and communities requiring exclusion of fire.
- Maintenance of a diversity of fire regimes through a pattern of 'mosaic burning' where only a small proportion of any vegetation community and/or remnant area is subject to the same fire regime.
- Varying the inter-fire period within the minimum and maximum thresholds at any given point so that individual species are neither advantaged nor disadvantaged by a homogenous fire regime.
- Maintaining refuges, to aid in protecting fauna during and after fire.
- Application of the precautionary principle to prescribed burning and undertaking studies into the effects of fire on species and communities.
- Complete an annual assessment of fuel loads and fire breaks to minimise the frequency and extent of unplanned fires.
- Monitoring changes in species composition and habitat elements post-burning is essential so that fire regimes are maintaining or improving remnant quality, rather than contributing to further degradation.

3.23.1 Identification of Ignition Sources

Bushfire ignition sources include natural occurrences such as lightning strikes, while other occurrences include sparks from powerlines and human ignition sources. Possible on-site ignition sources also include sparks and fire from machinery, fuel storage areas, and hot work practices (welding etc.).

Fire bans, as determined by the Rural Fire Service, will be adhered to by all personnel and will be enforced by MCO. Potential ignitions sources such as those resulting from hot work practices including welding and cutting will be restricted where possible to workshop areas or within active parts of the mine where vegetation is non-existent. If this is not possible due to the remoteness of the location all due care and caution will be employed to minimise the potential for fire ignition.

3.23.2 Control Measures

MCO will maintain water carts with fire fighting equipment capable of extinguishing fire outbreaks. This fire fighting equipment, together with graders and bulldozers used for mining, provides effective bushfire fighting capability. In addition, responsiveness is enhanced by emergency preparedness training for mine-site personnel.

Firebreaks will be established around MCO to prevent the spread of bushfires onto or from adjacent properties. These firebreaks will be inspected annually for adequacy.

Where the creation and maintenance of proposed firebreaks has the potential to interact with areas of Aboriginal Cultural Heritage Sites or Archaeologically Sensitive Areas these activities will be undertaken in accordance with MCO's Aboriginal Cultural Heritage Management Plan.

Any incident of unplanned bushfire will be reported directly to the Site Supervisor who will initiate an emergency response. If required, the local Rural Fire Service will be notified.

3.23.3 Preventative Measures

A number of mechanical methods may be used to achieve a reduction in fuel levels. Such methods include mowing, slashing, ploughing and manual removal. In addition, crash grazing by livestock can reduce fuel loads. The requirement for fuel reduction measures will be assessed annually.

A network of roads surrounding and traversing the operations will be maintained to allow access for fire fighting trucks, so that all areas of the MCO may be accessed.

Ready access will be maintained for vehicles to engage in water abstractions at dams on site or at defined water fill points. Outlets should be compatible with fire fighting equipment.

MCO has committed to working with the neighbouring mines and the RFS to periodically review and improve bushfire management plans for the local region.

3.23.4 Monitoring

A bushfire management inspection will be undertaken annually of vegetated areas. Inspections shall be undertaken prior to the bushfire season and appropriate actions taken, as necessary, to provide for fuel levels to be maintained at a minimum.

MCO shall liaise with the local Rural Fire Service as required, so that both parties are aware of fires in and adjoining the area of MCO. All fires identified on or near the area of MCO will be immediately reported to the ECRM and General Manager.

Fire weather conditions will be monitored regularly by MCO.

3.24 ABORIGINAL COMMUNITY CONSULTATION

Members of the Aboriginal community will be encouraged to raise any concerns regarding the rehabilitation of the mine and any potential effects rehabilitation has on Aboriginal cultural heritage.

Further detail of aboriginal community consultation is provided in the Aboriginal Cultural Heritage Management Plan.

3.25 MONITORING PROGRAM

The monitoring program described in this plan shall be used to measure the progress and success of the rehabilitation program post mining and enhancement activities in the offset areas. The monitoring approach described in this plan shall be reviewed regularly to identify adequacy and any modifications to the program shall be reported in the AEMR. Results of the monitoring program shall be carefully reviewed and if required management practices may be amended to achieve ecological objectives.

3.25.1 Flora Monitoring

A number of parameters are to be assessed during the monitoring component of the Ecosystem Function Analysis (EFA). These include:

- Landscape Function Analysis tool and vegetation assessment components;
- Visual monitoring; and
- Vegetation assessment tools.

For the purpose of this project they have been divided into four primary categories and an additional six subcomponents:

- Landscape Function Analysis (LFA);
- Landscape Organisation Index (LOI);
- Soil Surface Assessment (producing Stability, Infiltration and Nutrient Indices);
- Vegetation Dynamics (for woodland areas);
- Canopy cover for overstorey components;
- Ground cover components (plant basal cover, bare ground and leaf litter);
- Woody species density;
- Woody species richness;

- Habitat complexity; and
- Disturbance factors.

Each of these components are to be assessed individually to gain data on key elements of an ecosystem, however to gauge the true condition of that environment, when examined together, taking into account the relationships between various strata of the habitat, these elements will provide a more comprehensive picture of the relative health of an ecosystem. This is particularly useful when assessing the status of post mining rehabilitation works to demonstrate that the site is on a trajectory toward self sustainability.

Monitoring Site Selection

Post mining rehabilitation areas across MCO are to be examined to determine the nature of existing rehabilitation in terms of techniques used and final land use. Due to the potential for a wide range in rehabilitation domains, transects are to be established across representatives of each rehabilitation type including:

- Open Cut 1 and associated Environmental bund – WBYBBRGW with areas of Sedimentary Ironbark Forests and stands of *Allocasurina* species on post mining lands;
- Open Cut 2 and Open Cut 3 and associated Environmental bunds – native grasses to create sustainable agricultural land on post mined lands and
- in proximity to the permanent water storages on the post mined lands.

Transects established within post mining rehabilitation are to be referred to as Base transects, as they are generating the baseline data for the monitoring program. Base transects are to be established within 24 months of the rehabilitation works having been completed for each rehabilitation area and the location of these sites is to be reported in the AEMR.

Corresponding analogue transects for Open Cut 1 were established in 2010 in corresponding plant communities within remnant vegetation which occur outside the current mining operations area and beyond the current area planned to be mined in the future. These transects were designed to act as reference sites for the project, monitoring the effects of environmental factors above those incurred by rehabilitated lands or offset areas. A suitable number of transects were established in each domain to enable statistical analysis. The monitoring will be reported in the AEMR. Analogue transects will be established for Open Cut 2 and Open Cut 3 prior to the commencement of mining in Open Cut 2.

In addition to the above sites, monitoring transects will be established in areas that are representative of:

- White Box Yellow Box Blakely's Redgum Woodland;
- Non EEC native vegetated lands;
- Riparian zones of Moolarben and Bora Creeks; and
- Enhanced remnant vegetation on lands associated with UG4.

Transect Establishment

A permanent 50m transect is to be installed in the post mining rehabilitation areas (and corresponding analogue areas). Each transect is to be installed using the following technique:

- The site is to be randomly selected within the desired vegetation type;
- A 50m transect is to be laid out down slope (according to the requirements of EFA);
- A metal star picket is to be installed at the start and finish point of each transect;
- Each start and finish point is to be recorded using GPS and photographed down the transect from the start to the finish point; and
- Each star picket is to be marked with a length of high visibility flagging tape (or similar) to maximise the visibility of the transects.

Data is to be gathered along the transect (from the start to finish point) to produce the datasets for the EFA, Visual Monitoring, vegetation monitoring information for the non pasture areas.

Landscape Function Analysis

LFA is the primary component of the EFA monitoring technique. It assesses the functionality at the soil landscape level in terms of the landscape's ability to retain water and nutrients within the system. In terms of LFA, a soil landscape that is on a trajectory toward self sustainability (in context of vegetative cover and soil stability) would have:

- A high Landscape Organisation Index (LOI) i.e. a low number of bare soil patches (referred to as inter-patches) between obstruction components (referred to as patches) in the soil landscape, which would affect wind and water movement and the introduction and transportation of resources into and out of the system; and
- High Soil Surface Assessment indices, indicating that the site had favourable Nutrient, Infiltration and Stability characteristics.

Vegetation Monitoring

Vegetation monitoring is the other component of the EFA monitoring tool. This component is limited to the woodland areas as woody vegetation is typically not represented within pasture areas. An assessment of woody species density, species richness and canopy cover all contribute to the findings of the LFA in terms of available nutrients, soil stability and water infiltration. In terms of vegetation dynamics, a soil landscape that is on trajectory to self sustainability in context of vegetative cover would have:

- High percentage ground cover vegetation and/or leaf litter components with a corresponding low percentage of bare soil areas;
- High percentage canopy cover;
- High density of woody species; and ideally
- High species richness (particularly pertinent to habitat complexity components).

Visual Monitoring

The Visual Monitoring technique is a field based rapid assessment tool designed to visually assess and award a score to various landscape contributors. The following components are assessed using the Visual Monitoring tool:

- Vegetation components (overstorey, understorey and ground cover where applicable);
- Presence of exotic weed and feral animals species;
- Surface stability and erosion issues;
- Presence of available microhabitat; and
- Disturbance factors.

Each of these subcomponents is to be awarded a score to generate an overall score for each site. This allows comparison between different sites and over time. It also allows the identification of areas requiring remediation as indicated by low scores. In terms of Visual Monitoring a soil landscape that is on a trajectory toward self sustainability would ideally have:

- Diversity of overstorey and understorey vegetative components which are mature and reproducing;
- Diversity of ground cover components with good soil coverage and leaf litter contribution;
- Lack of weeds and / or site disturbance associated with feral animal activity;
- Stable surface nature with organic matter (i.e. topsoil with organic content);
- Lack of features attributable to erosion;
- Lack of soil compaction and slow to nil water runoff;
- High available microhabitat components; and
- Lack of disturbance factors including unauthorised access, rubbish and physical disturbance such as fire or vandalism.

Data Reduction and Tabulation

Field data that will be collected for the flora monitoring may include:

- Photographs from a reference point to be used for every monitoring program;
- Soil cover – physical surface cover and projected plant cover in terms of rain splash protection;
- Perennial basal cover;
- Leaf litter cover, depth and origin;
- Cryptogram cover;
- Crust brokenness – extent to which the soil surface crust is broken;
- Erosion type and severity;
- Deposited materials – nature and amount of transported alluvium;
- Soil surface roughness – soil relief and its capacity to capture and retain resources such as water and nutrients;

- Surface resistance to disturbance – crust flexibility and coherence with respect to ease of soil movement for erosion and infiltration ability;
- Slake test – stability of the soil fragments when exposed to inundation;
- Soil texture;
- Canopy cover;
- Woody species density and richness;
- Species list;
- Average tree height;
- Evidence of natural regeneration;
- Reproductive stage;
- Presence of weeds;
- Evidence of feral animals; and
- Evidence of other disturbance (e.g. vandalism, bushfire).

Field data is to be recorded using tools such as palm pilots and GPS, which allow for quick and accurate data capture and download into the relevant spreadsheets for data reduction and tabulation. The required scores for each component for each site are then entered into an overall database and analysed.

Timing of Monitoring Program

The flora component of the monitoring program is to be undertaken in accordance with the following:

- The floristic quadrats should be undertaken bi-annually, during spring and autumn. This will note seasonal species and growth rates and impacts from adverse weather conditions. Burrows (1999) noted in the south west slopes that while most floristic diversity was accounted for in spring surveys, there were several species that were only recorded during autumn. Furthermore, the NSW Department of Environment, Climate Change and Water (DECCW) guidelines for assessing Box Gum Woodlands recommends autumn survey, as one of the key criteria for assessing the presence of the community is the dominant of native perennials in the ground layer. These are most evident in autumn when they are not shrouded with annual exotics which predominantly grow in winter and spring;
- The LFA monitoring should be undertaken annually, generally in the lead up to spring (Aug-Sep) for areas of active regeneration;
- Given vegetation dynamics (ie densities, height and cover) is not expected to change drastically on an annual basis, particularly for woody strata, sampling should be undertaken every 4 years in areas of established vegetation; and
- The LFA should be implemented reactively immediately after an event such as significant rainfall or a bushfire, to sample any changes in landscape scores.

3.25.2 Fauna Monitoring

The fauna monitoring components are to be designed to produce data which is:

- Consistent with industry standards;
- Scientifically robust so that they can be repeated during future programs;
- Compliant with animal ethics and welfare standards and legislation;
- Safe for operators and site staff; and
- Cost effective for collecting data appropriate for monitoring needs.

An indication of the style of monitoring techniques and survey effort required is provided in **Table 20**. The exact number and location of data collection points (e.g. trap sites) are to be subject to modification based on site constraints and suitability as appropriate. The fauna monitoring is to incorporate the monitoring for feral animals.

Table 20: Fauna Monitoring Techniques

Method	Details	Effort
Elliot traps	Small traps placed in straight lines on the ground, primarily to target small and medium sized mammals.	At each site: • 10 medium Elliot traps (Elliot A); and • 3 large Elliot traps (Elliot B) • 4 nights.
Spotlighting	Pedestrian and vehicle based spotlight survey, two to three nights at each site. Targets nocturnal mammals, birds, reptiles and amphibians.	• At each site 1 hr spotlighting per night.
Hair funnels	At each site for 4 nights and possibly set in habitat trees if present. These target small and medium sized mammals.	At each site 10 hair funnels. • 4 nights
Nest Box inspections	Inspection: a series of nest boxes are to be installed across the project area. These will each require a one off inspection to check for use and if possible identify what species are using them.	Inspect nest box established in rehabilitation areas and offset areas.
Bat detection	Anabat recordings to identify microbats.	Two at each site over two nights.
Bird survey	Timed, fixed area surveys for diurnal birds, observing and listening.	At each site 1 hr observation.
Call playback	Nocturnal broadcasting of calls, two to three nights at each site. Targets nocturnal birds.	At each site 0.5 hrs of broadcasting.
Herpetological searches	Direct searches for reptiles, scanning surfaces, rolling logs and rocks and raking leaf litter.	At each site 0.5 hrs searching.

Method	Details	Effort
Dam Inspection – permanent water storage features	Dams and waterways will be inspected for frogs, once by day and once by night.	Effort will be dependent on the extent of the habitat.
Collection of scats	Collect scats and send to laboratory for analysis of predator and prey species.	Effort will be dependent on the frequency of scats encountered.
Habitat assessment	Assessment of fauna habitat values and signs (scats, scratches, diggings, etc.) at each site using standardised pro-forma.	1 survey will be completed at each site based on the methodology as described in other sections of this Plan.
Impact / damage caused by feral animals	GIS data and photos of scratchings, location of scats, warrens etc.	To be undertaken concurrently with other components of the field work.
Opportunistic observations	All opportunistic observations of fauna will be recorded.	To be undertaken concurrently with other components of the field work.
Results	To be presented to MCO in a report outlining the methodology, findings and any issues/recommendations developed during the survey. All GIS data to be collated and provided with final report.	Draft and Final Reports.
On site requirements	Fully comply with MCO's requirements for OHS.	Incorporated in all facets of the project.

Timing of Monitoring Program

The fauna component of the monitoring program is to be undertaken in accordance with the following:

- Diurnal Birds
  - Undertake monitoring annually in early spring (October/November).
- Nocturnal Birds
  - Undertake the monitoring annually in early spring (October/November).
- Mammals
  - Undertake monitoring annually in early spring (October/November).
- Bats
  - Undertake monitoring annually in spring (October/November).
- Reptiles
  - Undertake monitoring annually in early spring (September).

- Amphibians
    - Undertake the monitoring annually during late spring.

3.25.3 Geochemical Monitoring

Soil in the rehabilitation and revegetation areas will be monitored for pH, electrical conductivity (EC) and major cations to determine whether the vegetation substrate is approaching conditions similar to those found in the analogue sites. This data will be used to identify potential deficiencies over time and assist with the development of maintenance programs if underperforming areas are identified during visual and other monitoring. This will also assist with determining/demonstrating whether the soil is suitable as a long term substrate for sustainable rehabilitation/revegetation.

Soil samples will be taken to a minimum depth of 300 mm and samples taken from the 0 – 100 mm and 100 – 200 mm intervals and 200 – 300 mm. The samples will be taken from the monitoring transects utilised for the flora monitoring and are to be sampled every three years commencing in the year that the transect is established.

3.26 PERFORMANCE AND COMPLETION CRITERIA

It is recommended that specific completion criteria for both vegetation and soils are developed for 1 year, 5 year and 15 year time frames. However, experience has shown that there is no single "quick fix" indicator which unequivocally demonstrates that a rehabilitated ecosystem will be sustainable. The following criteria are proposed as preliminary rehabilitation criteria only. The process for further refining these criteria and developing final rehabilitation criteria can be seen in **Figure 7**. This process was followed in 2013 to refine the preliminary completion criteria with monitoring results and site experience being used during this review.

3.26.1 Preliminary Criteria for Open Cut 1 and Environmental Bund

Open Cut 1 will be rehabilitated using native species to create predominately WBYBBRGW with areas of Sedimentary Ironbark Forests and stands of Allocasuarina species also being used in the rehabilitation of Open Cut 1 and respective environmental bund.

Flora

The area rehabilitated to remnant vegetation is equal to or greater than the pre-mining extent.

- Species Diversity: The presence of overstorey (canopy) species is to be consistent with the range identified at analogue sites. WBYBBRGW overstorey will range from 1 – 3 overstorey species and Sedimentary Ironbark Forest will range from 2 – 3 overstorey species. The presence of groundcover species is to be consistent with those identified within the analogue sites, with a minimum of four native groundcover species present. Overstorey and groundcover species will reflect the vegetation association being rehabilitated.
- Natural Regeneration: Evidence of natural regeneration at Year 15 of at least four species representative of the vegetation association. These species may be different for each vegetation association.

To be researched and developed in consultation with Department of Resources and Energy as part of the Mining Operations Plan process by 2015 (five years after rehabilitation commencing in Open Cut 1):

- Minimum canopy cover in native ecosystem areas;
- Minimum tree height and girth standards for selected indicator species of the vegetation association to be researched and benchmarked at 1, 5 and 15 years; and
- Sufficient ground cover to provide a stable and sustainable land profile.

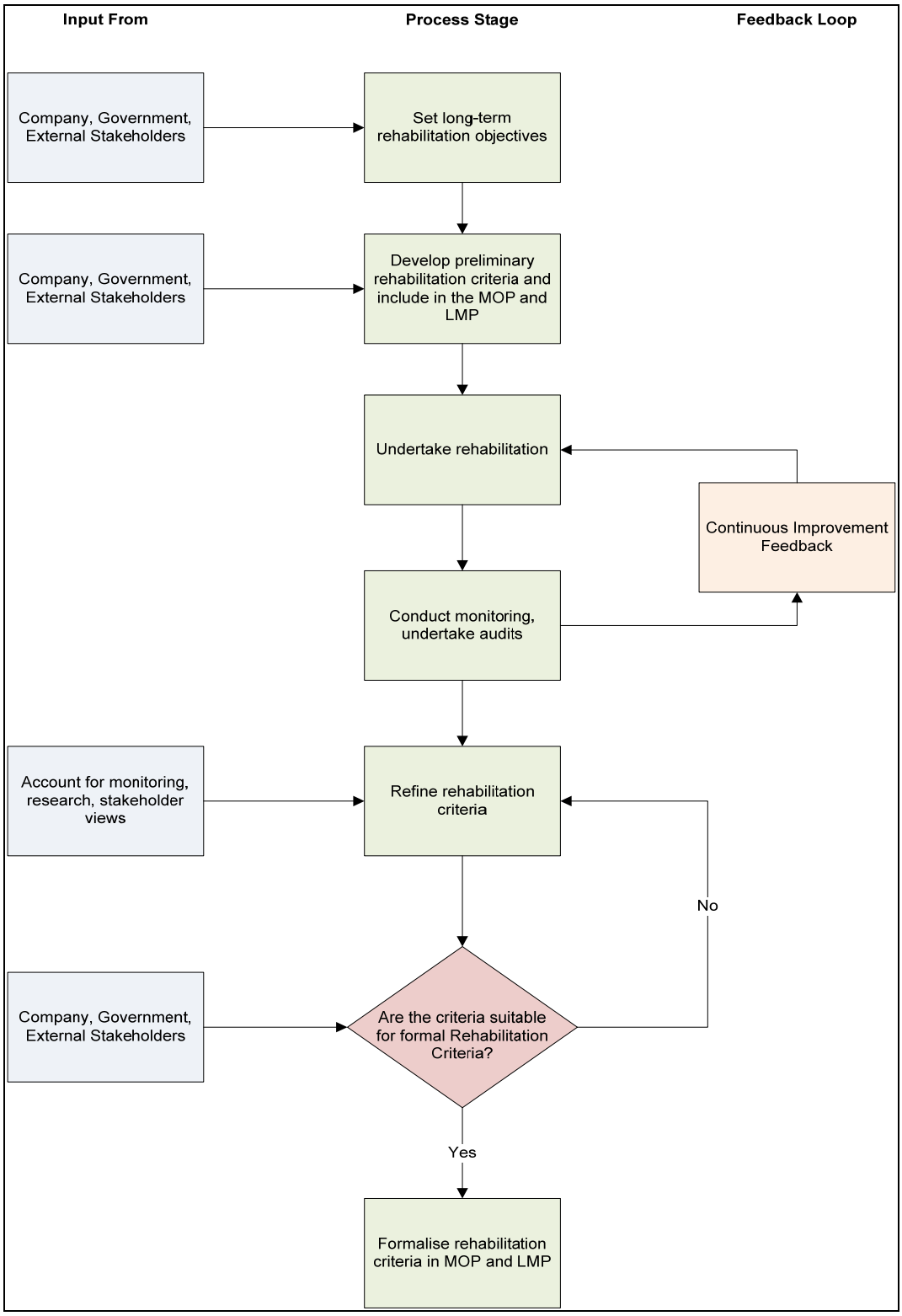

Figure 7: Process for Developing and Refining Completion Criteria

Fauna

Fauna monitoring will be undertaken to target key fauna indicator species at different stages of the rehabilitation. Key fauna indicator species will include woodland birds, microbats and reptiles. Trends in species diversity and numbers should show a trajectory towards the diversity and numbers within analogue sites. Evidence of fauna habitat utilisation should also be measured overtime, with roosting and nesting habitat measured for birds and microbats.

Soils

Physical and chemical soil data should be compared with data from samples from unmined analogue monitoring plots surrounding the mine. The analogue sites will be located in equivalent vegetation associations as to those that are being used in the rehabilitation. The progression of soil parameters towards those typical of undisturbed soils in surrounding areas can then be monitored. This will necessitate a one off assessment of physical and chemical soil parameters in surrounding unmined forest against which soil results from monitoring plots will be compared. Suggested criteria include:

- pH of replaced topsoil to be in the range of analogue sites after 5 years;
- Conductivity of replaced topsoil to be within 20% of analogue sites after 5 years;
- The surface layer to be free of hazardous materials to a depth of at least 1 metre;
- Runoff water quality less than 1,200 µS/cm after 5 years; and
- Soil Nitrogen and Phosphorous levels to be within 20% of levels of analogue sites after 10 years.

To be researched and developed in consultation with Department of Resources and Energy as part of the Mining Operations Plan process by 2015 (five years after rehabilitation commencing in Open Cut 1):

- Electrical conductivity and pH profile changes to 1m depth to be monitored for changes and compared with analogue sites.

Weeds and Feral Animals

- There are no significant weed infestations;
- Weeds do not comprise a significant proportion of the species in any stratum; and
- There are no significant feral fauna populations causing unacceptable damage to the area.

3.26.2 Preliminary Criteria for Open Cut 2 and Open Cut 3 and Environmental Bunds

Open Cut 2 and Open Cut 3 and respective environmental bunds will be rehabilitated using native grasses to create sustainable agricultural land.

Vegetation

- Species Diversity: The presence of groundcover species is to be consistent with those identified within the relevant analogue landscape.
- Natural Regeneration: Evidence of natural regeneration at Year 5 of at least four species.

Soils

Physical and chemical soil data should be compared with data from samples from unmined reference monitoring plots surrounding the mine. The reference sites will be located in equivalent vegetation associations as to those that are being used in the rehabilitation. The progression of soil parameters towards those typical of undisturbed soils in surrounding areas can then be monitored. This will necessitate a one off assessment of physical and chemical soil parameters in surrounding unmined forest against which soil results from monitoring plots will be compared. Suggested criteria include:

- pH of replaced topsoil to be in the range of reference analogue sites after 5 years;
- Conductivity of replaced topsoil to be within 20% of analogue sites after 5 years;
- The surface layer to be free of hazardous materials to a depth of at least 1 metre;
- Runoff water quality less than 1,200 µS/cm after 5 years; and
- Soil Nitrogen and Phosphorous levels to be within 20% of levels of reference sites after 10 years.

To be researched and developed in consultation with Department of Resources and Energy as part of the Mining Operations Plan process by 2019 (five years after rehabilitation commencing in Open Cut 2):

- Electrical conductivity and pH profile changes to 1m depth to be monitored for changes and compared with reference sites.

Weeds and Feral Animals

- There are no significant weed infestations;
- Weeds do not comprise a significant proportion of the flora species; and
- There are no significant feral fauna populations causing unacceptable damage to the area.

3.26.3 Preliminary Criteria for Offset Areas

The offset areas will be revegetated using native species to establish and enhance areas of the White Box Yellow Box Blakely's Red Gum Woodland. The offset areas will also enhance local vegetation cover and provide connectivity between isolated pockets of vegetation.

Vegetation

- Species Diversity: The presence of overstorey (canopy) species is consistent with the range identified at analogue sites. WBYBBRGW overstorey will range from 1 – 3 overstorey species and other vegetation communities undergoing revegetation should reflect the range associated with each vegetation association. The presence of groundcover species is to be consistent with those identified within the analogue sites, with a minimum of four native groundcover species present. Overstorey and groundcover species will reflect of the vegetation association being rehabilitated.

- Natural Regeneration: Evidence of natural regeneration at Year 15 of at least four species representative of the vegetation association. These species may be different for each vegetation association.

To be researched and developed in consultation with Office of Environment and Heritage by 2016 (five years after revegetation works commencing in the Offset Areas):

- Minimum canopy cover in native ecosystem areas;
- Minimum tree height and girth standards for selected indicator species of the vegetation association to be researched and benchmarked at 1, 5 and 15 years; and
- Sufficient ground cover to provide a stable and sustainable land profile.

Fauna

Fauna monitoring will be undertaken to target key fauna indicator species at different stages of the rehabilitation. Key fauna indicator species will include woodland birds, microbats and reptiles. Trends in species diversity and numbers should show a trajectory towards the diversity and numbers within analogue sites. Evidence of fauna habitat utilisation should also be measured overtime, with roosting and nesting habitat measured for birds and microbats.

Weeds and Feral Animals

- There are no significant weed infestations and weeds do not comprise a significant proportion of the species in any stratum.
- There are no significant feral fauna populations causing unacceptable damage to the area.

4.0 FINAL VOID MANAGEMENT PLAN

The preparation and continual update of the Final Void Management Plan (FVMP) will be undertaken in accordance with the Mine Closure Plan as outlined in the Department of Trade and Investment, Regional Infrastructure and Services guidelines for Mining, Rehabilitation, and Environmental Management (MREM). It is intended that this final void management plan will be progressively reviewed and updated over the remaining life of the mine to satisfy this requirement.

4.1 JUSTIFICATION FOR FINAL VOID LOCATION AND USE

Open cut mining at MCO may leave a pit voids (final void) in each of the Open Cut areas at mine closure. The options available for post mining land uses are generally determined by the location and nature of the void, and although the options presented at this time are considered appropriate, there may be more appropriate options at mine closure. Any such additional options would need to be assessed at that time.

4.1.1 Justification for Final Void Location

The location, depth and area of the proposed final voids will be dependent on the timing of mine closure and decommissioning, and the extent of mining undertaken at the time of mine closure. The conceptual final landform at MCO proposes one final void within Open Cut 1 and one final void within Open Cut 3 at mine closure. As the mine progressively develops and the actual timing of mine closure is established, a final void design will be determined and incorporated into a revised FVMP nearer to mine closure. Regardless of the location of final voids, all remaining final voids at mine closure will be left in a stable and safe condition. Final void management strategies are discussed further in **Section 4.4**.

4.1.2 Justification for Final Void Use

The proposed use for each of the final voids as identified in the 2006 Environmental Assessment Report, are as follows:

- Mining activities within Open Cut 1 will create two final voids, with a single final void remaining closer to mine closure. A larger void to the east of the infrastructure area will be potentially used for future access to other coal resources, and therefore remain. A smaller void located in the northern portion of Open Cut 1 is proposed to receive reject material from the processing of coal, due to the close proximity to the CHPP. It is anticipated that when the smaller void reaches capacity, the void will be rehabilitated. However, as mining progresses and further assessments determine more suitable final void use options within Open Cut 1, then this FVMP will be reviewed and revised to rationalise an acceptable final void end use.
- The final void options within Open Cuts 2 and 3 will most likely be located at the southern end of the pit. The location of the final voids will be determined during the MOP process. The voids are expected to constitute local groundwater sinks, due to evaporation from the open water surface in the pit. However, as mining progresses and further assessments determine more suitable final void use options within Open Cuts 2 and 3, then this FVMP will be reviewed and revised to rationalise an acceptable final void end use.

4.2 VALIDATION OF GROUNDWATER MODEL

4.2.1 Groundwater Predictions

Groundwater modelling for the MCP was undertaken as part of the 2006 Environmental Assessment Report. A numerical groundwater model of the groundwater system was designed to simulate groundwater conditions over a 1,600km2 area. The area of potential impact incorporated adjoining Ulan and Wilpinjong Coal mining projects. The 1,600km2 model domain is bounded in the south western corner by Cooyal Creek and the north eastern corner bounded by the Goulburn River near Comiala Flat. A model simulation of the mining operation was run for the proposed 15 year life of the project, and for a period of 45 years after the project completion to predict the post-project recovery of regional groundwater levels.

A summary of the groundwater modelling predicted for each open cut pit in the 2006 EA is presented below. This modelling will be validated as mining progresses in accordance with the Site WMP.

Open Cut 1

Open Cut 1 is proposed to encroach into the mapped alluvium along part of its north-western edge. That part of the pit is adjacent to the main Goulburn River valley, downstream of the confluence of Moolarben Creek with Sportsman's Hollow Creek, when it becomes known as the Goulburn River.

The southern part of Open Cut 1 is proposed to approach no closer than 200m to the edge of alluvium associated with Moolarben Creek. At this closest point, the pit floor level will be at an elevation of around 450mAHD, compared with a creek-bed level of around 430mAHD.

Based on the relative pit floor levels and the alluvium groundwater level, together with the separation between the pit and the edge of the alluvium, it is predicted that Open Cut 1 will have no direct impact on surface water flow or quality in Moolarben Creek, or on groundwater levels or quality in the Moolarben Creek alluvium.

As the groundwater levels are already well below the base level of the Goulburn River, it is predicted that the mining in Open Cut 1 will have no impact on flow or quality in Goulburn River. There is apparently no groundwater present in the Quaternary alluvium, and groundwater levels in the Tertiary alluvium, if present at all, are also well below both the Goulburn River bed level and the base of the associated Quaternary alluvium.

Open Cut 2

Open Cut 2 is located well to the east of the edge of alluvium associated with Moolarben and Lagoon Creeks, with the separation being 200m at its closest point. The Ulan Seam in this part of the deposit is only partly saturated, and in some places is entirely above the water table. This open cut is also located very close to the basin margin, and shows granite basement outcrop between the pit margin and the edge of the alluvium.

Based on the relatively shallow depth of coal in Open Cut 2, the low water table level, the lateral separation of at least 200m between the proposed pit and the edge of the alluvium, and the occurrence of granite outcrop between the pit and the alluvium, it is predicted that Open Cut 2 will have no direct impact on surface water flow or quality in Moolarben Creek and Lagoon Creek, or on groundwater levels or quality in the alluvium associated with those creeks.

Open Cut 3

The mining of coal from the proposed Open Cut 3 is not expected to impact directly on either Moolarben Creek or the Quaternary alluvium. The proposed open cut is located well away from the creek, and in most areas, the lowest floor elevation of the open cut will be at or above the creek-bed level in Moolarben Creek.

There is a small section at the very southern end of Open Cut 3, where the pit extends by up to about 5m below the expected groundwater level within the Permian Coal Measures. The open cut at this location is 600m from Moolarben Creek, but is very close to the tributary Spring Creek. The mining may lead to a temporary reduction in groundwater levels in the vicinity of this low point in Open Cut 3, but by only of the order of about 5m. The groundwater level in this area is currently about 10m below the ground surface at Spring Creek, so an increase to 15m as a result of mining is not expected to have a material impact on loss of surface flow from Spring Creek, or from any associated alluvium.

4.2.2 Future Groundwater Modelling

To verify the impacts the project may potential have on groundwater resources and comparison with the groundwater flow model predictions, groundwater monitoring at MCO will be undertaken in accordance with the WMP.

The collected data will be reviewed regularly to determine the impacts on groundwater resources and compare predications made in groundwater flow models. A summary of the results will be included in the Annual Environmental Management Report (AEMR).

The results from further groundwater modelling assessments will assist MCO with final void management decisions. Final void management strategies are discussed further in **Section 4.4**.

4.3 SURFACE WATER INTERACTIONS

The impacts on stream hydrology associated with all three open cut pits are considered to be similar due to the location of the open cut mines relative to the creeks that the land surface currently drains to. To mitigate the potential impacts of the open cut pits on stream hydrology and water quality, a number of water management strategies are proposed. The broad water management strategies relevant for final voids are to:

- Divert as much clean surface water runoff from upslope areas around mine areas and allow it to runoff and enter the creek system as it currently does and thereby maintain environmental flows as much as possible;
- Collect runoff from disturbed or operational areas of the mine site and store it in strategically located sedimentation ponds and treat it for re-use (for example in dust suppression activities, and coal preparation); and
- Undertake a comprehensive surface water monitoring program.

The final voids have been designed to be a small as possible, while allowing for the efficient mining of coal from within the approved mining area. It is anticipated that following open cut mining the final voids in OC 2 & 3 will gradually fill with water from rainfall that falls on the final landform below the

natural surface and report to the void. The expected quality of the water for the three proposed open cut pits (2006 EA) is summarised in **Table 21**.

Table 21: **Predicted Water Quality**

Open Cut	Parameter	Quality
Open Cut 1	pH	6.45
	EC (Salinity) µS/cm	643
Open Cut 2	pH	4.24
	EC (Salinity) µS/cm	578
Open Cut 3	pH	6.52
	EC (Salinity) µS/cm	3157

4.3.1 Surface Water Monitoring

To verify the impacts the project may potentially have on surface waters, a comprehensive surface water monitoring at MCO will be undertaken in accordance with the WMP. The data collected from the SWMP will be reviewed regularly to determine exceedances or triggering of criteria established within the WMP. A summary of the monitoring will be included in the AEMR.

4.4 FINAL VOID MANAGEMENT STRATEGIES

The primary objective of the final void management is to:

- Propose mitigation measures to minimise potential off site impacts associated with the final void(s) at MCO;
- Propose measures to be incorporated in the final landform which aim to minimise potential safety hazards to the general public; and
- Present options for the final land use of the void following the completion of mining at MCO.

4.4.1 Final Void Impacts

Preliminary Risk Analysis

A preliminary risk analysis for the project was prepared in the 2006 EA, where issues raised through consultation with government agencies and the public where risk analysed in further detail. The main impacts identified with respect to final voids and land rehabilitation, for the project included:

- Inappropriate and inadequate rehabilitation;
- Safety issues; and
- Final landform and final void management in contrast with strategic land use objectives.

Proposed Controls

To address the impacts identified in the preliminary risk assessment undertaken for the project, a number of key actions were proposed in the 2006 EA, which included:

- Progressive rehabilitation of open cut areas;
- Design of mine plan to minimise final voids;
- Shaping of landforms compatible with existing topography;
- Battering of final void slopes;
- Benching and revegetation of final void slopes where possible;
- Preparation of Land Management Plan; and
- Preparation of a Mine Closure Plan.

4.4.2 Managing and Monitoring Final Void Impacts

The following measures discussed in Section 4.4.3 are to minimise, manage and monitor final void impacts. These measures will be progressively evaluated as mining develops, to determine the most appropriate approach to mitigate potential impacts from final voids.

There are several objectives for the rehabilitation of MCO's open cut areas, which include:

- Minimise the area of disturbance and maximise the area of land restored to its former land capability; and
- Re-establish stable, safe and effective landforms and surfaces by designing the final landforms, voids and emplacement to be cognisant of revegetation, slope stability, surface drainage, erosion and sediment control.

4.4.3 Final Void Rehabilitation

Low Walls

The low wall is assumed to comprise of mixed, disturbed and fragmented material. Stability of the low wall will be achieved in the following manner:

- The low wall will be battered back from the angle of repose to maintain the long term geotechnical stability of the face, with the determination of geotechnical stability and recommendations as to the final slope undertaken by a qualified geotechnical engineer on the basis of an assessment of the overburden material, the likely degree of settlement, and the degree of weathering expected in the long term. However it is expected that the low wall sides of the final void will be battered back to a maximum of 18^{o} with a goal of 10^{o} being optimal;
- Surface water drainage on and over the low wall will be minimised through the construction of drainage control structures which will aim to divert as much of the catchment as possible away from the final void;

- Erosion of the low wall will be controlled by limiting the length of slope through the use of contour and graded drains, minimising the slope, and by the establishment of suitable vegetation; and
- Battering of the low wall against the bottom of the high wall, where possible, to enhance highwall stability. Benching of the spoil material may need to be considered in some areas in order to achieve geotechnical stability and minimise erosion.

High Walls

The high wall is assumed to comprise of undisturbed, solid material generally occurring above the economically lower-most limits of the mineable seam in the final void. Depending on the geology of the deposit, the high wall material may comprise a range of natural occurring soil or rock materials of varying strengths or states of weathering.

To maintain the safety of the final void, the surrounding final slopes should be left in a condition where the risk of slope failure is minimised. This will be assessed by a suitably qualified geotechnical engineer.

The following will need to be considered when assessing the geotechnical stability of the high wall:

- Long term final void water levels;
- Height and inclination of slope and number and spacing of intermediate benches (as may be required to achieve the final slope);
- Shear strength of the high wall soils and rocks;
- Density and orientation of fractures, faults, bedding planes, and any other discontinuities, and the strength along them; and
- The effects of the external factors, such as surface runoff.

Where possible, an appropriate grass and shrub / tree seed mix will be applied to the high wall, if necessary using specialised techniques such as aerial seeding or hydro seeding. The purpose is to establish a vegetation cover which will provide some stability, but also offer visual impact mitigation.

Spontaneous Combustion

While spontaneous combustion is considered a low risk of occurring, it has been included in this document for reference as it is often an issue associated with final voids, particularly where coal seams (and other carbonaceous materials) are left exposed (i.e. not capped or covered). There is also the possibility that a bushfire post closure could ignite the seams if they are in close proximity.

The following will be undertaken to reduce the potential for spontaneous combustion to occur:

- Accumulations of coal, coarse rejects and other carbonaceous material, particularly if it is known to contain pyritic material, will be buried under a minimum of 1.5m of inert overburden material; and

- Should any outbreaks of spontaneous combustion occur during mining operation, the details of the materials involved, presence of pyrites, location, date, time and climatic conditions will be recorded on surveyed plans. These areas will be assessed at closure to put in place appropriate mitigation measures to minimise the likelihood of spontaneous combustion occurring post mine closure. These areas will also be included as part of the ongoing inspection and monitoring that will be required following closure of the mine and before final lease relinquishment.

Control of Surface Water

The control of surface water inflow into the final void is essential for the long term management of water quality within the pit and will also aid in the control of erosion to low walls and highwalls. Surface water is a possible cause of slope deterioration and ultimate failure.

Drainage will be directed away from the highwall face (where ever possible) through the construction of interceptor channel drains around the perimeter of the highwall and spoon drains will be utilised on the upslope side of all benches.

Drainage over the low wall will be minimised through constructing surface water diversions, and drainage on the low wall will be limited and controlled to reduce the erosion potential. The catchment area of the final void will be minimised by the installation of diversion drains.

Public Safety

At mine closure, one of the main priorities for the final void will be to render it safe in terms of access by humans, livestock and wildlife. In order to achieve this, the following key activities will be considered:

- Instability of the lowwall can induce failures or mass movement. To maintain the stability of the lowwalls they will be battered back;
- In addition, instability of the highwall can also induce failures and mass movement. To maintain the stability of the highwalls that are to be retained post closure, an appropriately qualified Geotechnical Engineer will be consulted on final highwall design;
- Where possible, the exposed coal seams will be covered with inert material to prevent ignition either from spontaneous combustion, bushfires or human interference;
- A physical barrier will be constructed at a safe distance from the perimeter of the void to prevent human access. The highwall areas will be secured by the construction of a trench and a safety berm, as well as a security fence along the entire length of the remaining highwall. This is to provide an engineered barrier between the pit and the surrounding area. The trench and berm is to be constructed in such a way that it will physically stop most vehicles;
- Suitable signs, clearly stating the risk to public safety and prohibiting public access will be erected intervals along the entire length of the fence;
- Surface runoff from land surrounding the void will be diverted so as to prevent any potential development of instability of the void walls; and

- Where practicable, grasses and shrubs / trees selected to conform to the agreed post-mining rehabilitation criteria and land use will be planted along the outside edge of the bund wall to lessen any visual impact of the wall.

Monitoring Final Void Impacts

Monitoring of the final voids will be undertaken as part of ongoing program during the care and maintenance period. The monitoring program of the final voids will include erosion control, surface water control, runoff volumes and geotechnical stability. This program will be undertaken until such time that it could be determined that the final voids pose minimal environmental risk and public safety.

Further specific details regarding final void management will be finalised as part of the detailed Mine Closure Plan, which will be prepared within five years of projected mine closure in accordance with relevant development consent conditions.

5.0 MINE CLOSURE PLAN

5.1 MINE CLOSURE PLANNING

The preparation and continual update of a Mine Closure Plan is outlined in the Department of Industry and Investment (DII) guidelines for Mining, Rehabilitation, and Environmental Management (MREM). It is intended that this mine closure plan will be progressively reviewed and updated over the remaining life of the mine to satisfy this requirement.

Planning for mine closure includes integrating the closure design for the entire mine site, identifying the timing of the planning process, considering issues which relate to specific rehabilitation methods and economical and community objectives, as well as making sure adequate financial provisions have been set aside.

The principal objectives of mine closure planning incorporated into this mine closure plan include:

- Providing an overall framework for mine closure including rehabilitation and decommissioning strategies. In this regard a mine closure plan should be considered a template on which future activities should be based;
- Maintaining adequate financial provision to cover the cost of decommissioning, final rehabilitation and any other post closure costs related to the closure of the MCO site;
- Establishing clear and agreed criteria with all relevant stakeholders, which can be used to provide the standard to which the final mine rehabilitation and post mining land use can be assessed against;
- Reducing or eliminating adverse environmental effects once the mine ceases operation;
- Completing closure in accordance with good industry practice as well as meeting the statutory requirements that may be applicable; and
- The closed mine not posing an unacceptable risk to public health and safety.

The most effective mine closure plans are those that are integrated with the long term operational plans of the mine and are subject to regular review to accommodate regulatory, technological, social and economic change.

5.1.1 Mine Infrastructure

The following major components of MCO have been considered as part of this mine closure plan:

- Active open cut mining areas, including high wall, low wall, void and overburden emplacement areas;
- CHPP;
- Conveyors, gantries and transfer towers;
- Raw and product coal stockpiles;
- Rail loadout facility and rail loop;
- ROM pads and bins;

- Office facilities and bathhouse;
- Fuel farm and oil storage areas;
- Workshop infrastructure; and
- Underground mine portal, transport, conveyor and ventilation shafts.

5.1.2 Mining and Processing Activities

Open-Cut

Open cut mining will be undertaken using conventional truck and excavator techniques. However, as mining technologies advance and economies change, the provision of new or revised mining methods will be pursued generally in accordance with industry best practice.

At Open Cut 1, coal will be transported from the open cut to a 100,000t ROM stockpile or dumped directly to a 400t capacity dump hopper located adjacent to Open Cut 1. Coal will be reclaimed from the stockpile by front end loader and fed into the dump hopper and then to a primary sizer to reduce the coal to 350mm topsize. The coal is then conveyed to a secondary sizer station to reduce the coal to 125mm topsize, which is a suitable size for conveying over long distances. The dump hopper, primary and secondary sizers will be located in a box cut below ground level. The ROM coal will be transported by overland conveyor to the overhead tripper conveyor over the plant feed stockpile, a distance of approximately 2km.

ROM coal from Open Cuts 2 and 3 will be transported to the Open Cut 1 facilities by trucks on internal haul roads. The haul roads are fully bunded to reduce noise.

Underground

Initially, a continuous miner will be utilised to drive the underground tunnels, known as main headings and gate roads, by mechanically cutting coal using a rotating drum fitted with dozens of cutting picks. Shuttle cars are filled by the continuous miners and the coal is transferred to a conveyor system for transport to the surface.

Longwall mining will also be undertaken at the site. Longwall mining is generally performed in a nearly continuous operation using specialist, integrated mining and roof support equipment. The longwall mining will commence in the south eastern corner of the underground area at Panel 1, which is progressively mined from east to west.

The surface ROM coal system for Underground No.4 commences at the discharge point of the drift conveyor and consists of a conical stockpile with a reclaim conveyor and feeder arrangement in a tunnel below the stockpile. Reclaimed coal will be conveyed to a secondary sizer station and then to the plant feed stockpile via tripper conveyor. A nominal stockpile capacity of 100,000t has been allocated for combined longwall and development production. The drift conveyor discharge will be 50m above ground, allowing the conical stockpile to reach up to 45m in height. Should additional stockpile capacity be required, the area to the northeast will be available for dozer push out. Dozer push will be needed to assist reclaim as the stockpile volume diminishes.

Preparation and Processing

All coal extracted in the underground and three (3) open cut coal mines (approximately 12Mtpa ROM) will be handled and processed by the coal handling and preparation facilities.

Separate ROM coal handling systems are required for the open cut and underground mines. An overland conveyor approximately 2km long will connect Open Cut 1 to the main surface facilities north of the Gulgong - Sandy Hollow Railway Line.

The CHPP feed stockpile of 100,000t will be established to receive coal from Underground No.4 and the open cut mines. The stockpile will be divided into two distinct sections, one for export feed coal and the second for domestic feed coal. Should additional stockpile capacity be required, the areas on both sides are available for dozer push out.

The reclaimed plant feed is then conveyed to the tertiary sizing station where it will be separated with the undersize material bypassing the sizer, and the oversize passing to a tertiary sizer for reduction to 50mm topsize. The undersize material and tertiary sized material is then conveyed to the CHPP.

The CHPP will process approximately 12Mtpa of raw coal per annum producing approximately 10Mtpa of product coal. The plant will primarily produce two thermal coal products, a low ash export coal and medium ash domestic coal.

The facility has the ability to supply power stations in the Hunter Valley, Central Coast or the Lithgow area, or alternatively access export facilities in Newcastle or Port Kembla. It is anticipated that there will be up to 2Mtpa transported west from the loop, and up to 10Mtpa transported east.

5.1.3 Rehabilitation Activities

Rehabilitation for erosion and sediment control purposes has been undertaken progressively. Rehabilitation activities during the construction phase related to landscaping and erosion and sediment control. Rehabilitation activities during the mining phase have focused on the reshaping and rehabilitation of the environmental bund. To the end of April 2013, approximately 120ha of land in Open Cut 1 has been rehabilitated.

5.2 LEGAL AND OTHER REQUIREMENTS FOR MINE REHABILITATION AND MINE CLOSURE

Government agencies at both the State and Federal level have formulated regulations, policies and guidelines that relate to mine closure and decommissioning. In addition, a number of industry and government councils have also developed frameworks / guidelines for mine closure.

This mine closure plan has generally been developed to be consistent with the objectives of these key policies and guidelines described in the section below.

5.2.1 Government Regulatory Frameworks

Mining Lease Conditions

The principal regulatory instrument related to mine closure and decommissioning are the conditions attached to the Mining Lease issued by the Minister in accordance with the requirements of the Mining Act (1992). It specifies such matters as the demolition and removal and make safe of mine infrastructure and landforms. It requires the progressive rehabilitation of the areas disturbed by mining, utilising a security deposit provision linked to the MOP for the mine.

Furthermore the mining lease is subject to a condition that the holder of the lease will not suspend mining operations within the mining area otherwise than in accordance with the written consent of the Minister. Such consent requires conditionally the documentation of systematic and timely decommissioning, clean up and rehabilitation to be incorporated in a final MOP.

In preparing a MOP, a mining company is to make specific reference to mine closure and decommissioning, providing final landform/rehabilitation outcomes. The NSW Department of Trade and Investment (DTI) requires that all MOP's lodged within 3-5 years of mine closure contain detailed information on mine closure and decommissioning. The completion and sign off of an acceptable mine closure and decommissioning strategy is the principal requirement to obtaining relinquishment of the mining lease following the cessation of mining.

MCO has the following leases and licences:

- Moolarben Coal Mine Exploration Licence EL6288 under the Mining Act, 1992, granted by the Minister of Mineral Resources.
- Moolarben Coal Mine Exploration Licence EL7073 under the Mining Act, 1992, granted by the Minister of Mineral Resources.
- Moolarben Coal Mine Exploration Licence EL7074 under the Mining Act, 1992, granted by the Minister of Mineral Resources.
- Moolarben Coal Mine Mining Lease ML1605 under the Mining Act, 1992, granted by the Minister of Mineral Resources in December 2007 for the mining of coal.
- Moolarben Coal Mine Mining Lease ML1606 under the Mining Act, 1992, granted by the Minister of Mineral Resources in December 2007 for the mining of coal.
- Moolarben Coal Mine Mining Lease ML1628 under the Mining Act, 1992, granted by the Minister of Mineral Resources in February 2009 for the mining of coal.

Other Department of Trade and Investment (DTI) Guidelines

Further to the requirements of the Mining Lease, the DTI also has in place a series of policy guidelines or Environmental Management Guidelines for Industry that are either directly or indirectly relevant to mine closure issues. They include:

- DTI Guideline EDG03: – Guidelines to the Mining, Rehabilitation and Environmental Management Process;

- In 2006, the DTI released a revised version of EDG03, Guidelines to the Mining, Rehabilitation and Environmental Management Process which included requirements for Mine Closure to be included in MOPs. The main objectives of closure planning under the guideline are:
    - to protect the environment and public health and safety by using safe and responsible closure practices;
    - to reduce or eliminate environmental effects once the mine ceases operations;
    - to establish conditions which are consistent with the pre-determined end land use objectives; and
    - to reduce the need for long term monitoring and maintenance by establishing stable landforms.

These policies and guidelines were considered in the preparation of this mine closure plan (where appropriate).

Environment Protection Licence (EPL)

The Protection of the Environment Operations Act 1997 (POEO Act) requires all extractive industries, including coal mines, to hold an Environment Protection Licence (EPL). Licences are issued by the EPA and are normally reviewed every three years. The EPL contains specific conditions relating to the protection of the environment and as such the relevant conditions have been considered in the preparation of this mine closure plan where applicable.

Moolarben Coal Mine EPL No. 12932 issued under the Protection of the Environment and Operations Act, 1997, granted by the EPA on 18 August 2008 for the mining of coal.

Project Approval Conditions

The Project Approval for MCO includes the conditions that are relevant to mine closure such that they impose restrictions on the final rehabilitation and/or landform design. They also include other conditions that contain the requirements to undertake monitoring beyond the cessation of mining. Where appropriate these conditions have been considered in the preparation of this mine closure plan.

Water Licences issued under the Water Act (1912) and Water Access Licences issued under the Water Management Act (2000)

Water Licence Approvals contain conditions that are relevant to mine closure, requiring the licensee to construct and maintain any works in a stable state for the life of the project.

MCO hold numerous licences for monitoring bores granted by NSW Office of Water under the Water Act, 1912. MCO also hold one licence for pit dewatering and four production licences for mining use and one surface water licence for a dam issued under the Water Act, 1912.

5.2.2 External Guidelines and Polices

Strategic Framework for Mine Closure (ANZMEC and MCA, 2000)

The Strategic Framework for Mine Closure (2000) has evolved as a cooperative development between the Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Australian Minerals Industry represented by the Minerals Council of Australia (MCA). It provides a framework of issues to be considered as part of a mine closure plan.

This mine closure plan has been prepared to be consistent with this strategic document.

Enduring Value – Australian Minerals Industry Framework for Sustainable Development

Enduring Value is a code where signatories commit to the principles of Sustainable Development. It replaces the old Minerals Industry Code of Conduct for Environmental Management.

MCO is currently not a signatory to the Code, although the general principles have been considered in the preparation of this mine closure plan.

Enduring Value builds on the industry's commitment to continuous improvement in performance as outlined in the Australian Minerals Industry Code for Environmental Management (1996 – 2000).

5.2.3 Other State and Federal Agencies Policy and Guidelines

While not specifically relevant in a regulatory context, other State agencies have also developed guidelines and policies that are applicable to mine closure and decommissioning.

The policy and guidelines considered in the preparation of this plan include:

- Australian Minerals and Energy Environment Foundation (AMEEF) – Best Practice Environmental Management in Mining series;
- Northern Territory Department of Mines and Energy – Mine Close Out Criteria: Life of mine planning objectives;
- Chamber of Mines and Energy of Western Australia – Mine Closure Guidelines for Minerals Operations in Western Australia;
- Queensland Mining Council – Guidelines for Mine Closure Planning in Queensland;
- NSW Groundwater Policy Framework Document;
- NSW Groundwater Quantity Management Policy;
- NSW Groundwater Quality Protection Policy;
- State Groundwater Dependant Ecosystem Policy;
- State Rivers and Estuaries Policy;
- Farm Dams Policy;
- Weirs Policy;
- NSW Salinity Strategy; and
- NSW Water Conservation Strategy.

5.3 THE ADOPTED APPROACH TO PREPARING THE MINE CLOSURE PLAN

The basic approach adopted to identify the mine closure issues is illustrated in **Figure 8**.

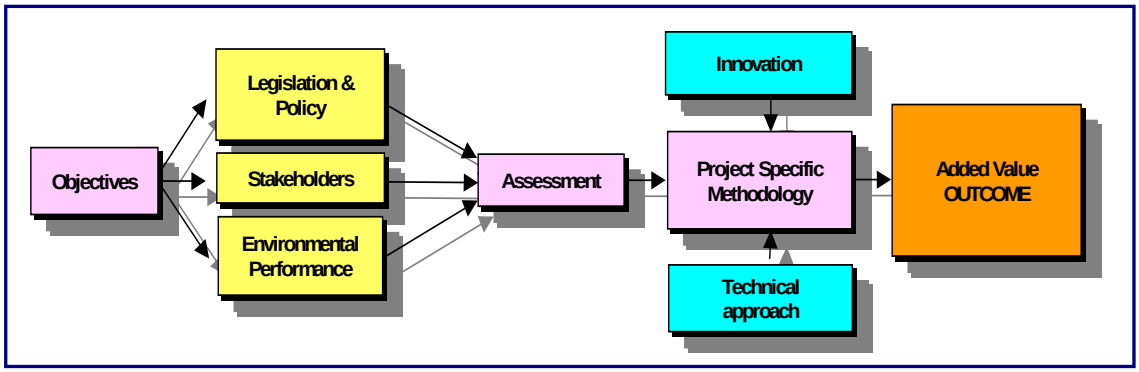

Figure 8: Basic Mine Closure Approach

The approach adopted for developing this mine closure plan has been firmly built on a planning focus for the process of mine closure to be able to occur in an orderly, cost effective and timely manner.

5.3.1 Mine Closure Management "Domains"

In order to best address the complexity of different mining activities across the site, the mine site has been divided into a series of management "domains" that enable better focus on the treatment of like areas.

By addressing each like "domain" systemically the specific aspects related to the closure of the mine have been addressed. This included considering the combination of the location of the site, type of land disturbance and the specific environmental issues to be addressed.

This systematic approach has the added benefit in that it enables MCO to identify and progressively implement effective mine closure and decommissioning. This will result in the following key benefits both during and at the end of mining operations:

- Continually reduces liabilities by optimising rehabilitation works;
- Provide for a more accurate assessment of accrual for rehabilitation liability;
- Tests rehabilitation design;
- Reduces double handling;
- Enables a tighter control on "actual" costs to undertake various rehabilitation treatments and enables improvement in budget allocation;
- Identifies areas of high environmental risk (e.g., coal stockpiles, hydrocarbon contaminated areas); and

- Facilitates direct involvement by internal stakeholders (i.e. mining supervisors).

The following includes a summary of the domain areas used in this Mine Closure Plan.

- Domain 1. Open Cut No. 1
- Domain 2. Open Cut No. 2
- Domain 3. Open Cut No. 3
- Domain 4. Underground No. 4 and CHPP

These domains will be discussed in further detail in **Section 5.4**.

5.3.2 Stakeholder Engagement

MCO has recognised the value of identifying and engaging the key stakeholders during the development of a Conceptual mine closure plan. This is important as it enables recognised stakeholders to have their interests considered as part of the mine closure planning process. Engaging relevant stakeholders is seen as one of the fundamental principles for effective mine closure, as the closure of the mine can often be responsible for substantial changes in both the community and the environment in which it operates.

5.3.3 List of Stakeholders Required to be Consulted

As stated in Condition 44 of the Project Approval, consultation with key government departments (OEH, NOW and DTI) is required for the preparation of the LMP, and subsequently this Mine Closure Plan. A copy of their responses, where relevant to the Mine Closure Plan can be seen in **Appendix 2**.

In addition, consultation will be undertaken with the community through the Community Consultation Committee (CCC), the OEH and Mid-Western Regional Council (MWRC) once the project is progressed. This will include, but not be limited to providing this conceptual Mine Closure Plan for their consideration and comment.

5.3.4 Socio-Economic Effects Associated With Mine Closure

Moolarben Coal Operations

MCO recognises that the closure of the mine at that time is likely to have some impact on the local community. As part of the Mine Closure Process, MCO proposes to prepare a Social Impact Assessment (SIA). This will be prepared five years prior to closure, which is currently scheduled for 2028.

The SIA will consider the following keys issues with regard to closure:

- Consider the demands and contributions of the mine on local services to better assess the impacts of closure on those demands and contributions;
- Social sustainability post closure;
- Establishing a benchmark for retention of economic activity within the site;

- Studies/monitoring of social contributions and sustainability post closure;
- Consider relationships with local suppliers (including business planning workshops pre-closure with local businesses to assist them moving on from reliance on the mine);
- Stakeholders' ideas of end land use and their perceptions as part of the planning for the mine closure plan and incorporating the consultation into developing and finalising the plan;
- During the preparation of the stakeholder consultation strategy there will be careful consideration of the methodology and consultation with individual stakeholders at each stage; and
- The nature of the current economic/social contribution compared to the future contribution / loss of contribution post closure.

The existing workforce will be retained until the cessation of coal mining. It is then anticipated that a reduced crew will be retained to complete any final decommissioning and rehabilitation works. Given the majority of the workforce are employed by MCO, they will be responsible for retaining the required skills to enable the closure and decommissioning activities to be completed.

The key aspects that will need to be considered in relation to human resource issues moving towards closure include:

- Communication with workforce regarding closure. A communication strategy needs to be developed to inform the workforce;
- retaining key technical staff and mine workers required to implement closure of the site;
- Redundancy packages to be offered;
- When redundancy packages will commence being offered. Develop a strategy for scaling back the operation;
- Investigate the possibility of transfer of employment to another mine site;
- Counselling, career advice and training services to be offered to employees;
- Establishing a benchmark for retention of economic activity within the site;
- Studies/monitoring of social contributions and sustainability post closure;
- Relationships with local suppliers (business planning workshops pre-closure with local businesses to assist them moving on from reliance on the mine);
- Stakeholders' ideas of end land use and considering their perceptions as part of the planning for the mine closure plan and incorporating the consultation into developing and finalising the plan;
- The preparation of the stakeholder consultation strategy which needs to give careful consideration to the methodology and consultation with individual stakeholders at each stage;
- The study data as part of planning for closure including data related to employees, suppliers and the wider community; and
- Understand the nature of the current economic / social contribution in order to consider the future contribution / loss of contribution post closure.

In addition to these Human Resource commitments, MCO will be responsible for providing funds required to address issues related to the Community. This may include, but not be limited to:

- Community Trust Fund; and
- Other Community Programmes.

Table 22 provides a summary of the stakeholder strategy that will be generally adopted for mine closure.

Table 22: **Summary of the Stakeholder Strategy to be used During Mine Closure**

Stakeholder	Proposed Strategy	Issues to be addressed
Employees	Focus groups	Re-training Re-location Business development support Networks Voluntary Redundancies
Local Councils	Presentation with feedback invited	Baseline data Potential Impacts Planning Guidelines Future Use of the site
DTI and DP&I	Presentation with feedback invited	Baseline data Potential Impacts Planning Guidelines Future Use of the site
Near Neighbours	One–on–one interviews Information Sessions / invitation to comment	Future of the site Any concerns re Closure
Mine Subsidence Board	Presentation with feedback invited	Management of subsidence.
Special Interest Groups	Information Sessions / invitation to comment	Future Use of the site Identified potential impacts Strategy for enhancing benefits to local and regional communities
Broader Community	Media release and invitation to comment	Future Use of the site Opportunities Social Impact of Closure

5.4 MINE CLOSURE

The following section of the mine closure plan outlines the proposed commitments for each domain under the scenario of Mine Closure in 2028. It is also intended that the satisfactory completion of these proposed commitments would be used as criteria to demonstrate that the decommissioning and rehabilitation of each of the nominated domains has been successfully completed. Further discussion of specific mine closure criteria is included as **Section 5.5** of this Mine Closure Plan.

5.4.1 Description of the Decommissioning and Rehabilitation Commitments for Each Domain

An outline of the scope of each of closure activities within each domain is outlined in **Table 23**.

Table 23: Mine Closure Domains and Activities

Domain	Sub-Domain	Closure Activities
1. Open-cut No. 1	1a. Administration and workshop area	• Removal of site services, i.e. electricity, telecommunications • Demolish buildings and fixed plant • Remove light and heavy vehicle wash pads • Remove roadways and car parks • Backfill open drains • Dismantle sewerage treatment plant • Remove fuel farm and waste oil/lubricant storage areas • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Undertake contaminated site assessment and remediate where required • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	1b. Access Road	• Remove access road • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	1c. Final Void	• Reshape and stabilise overburden dumps • Stabilise and secure final void • Stabilise highwall • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Rehabilitated with appropriate vegetation cover as prescribed in the MOP • Implement groundwater monitoring program as required
	1d. ROM stockpile, crusher, reject bin, and dump hopper	• Removal of site services, i.e. electricity, telecommunications • Demolish equipment and fixed plant • Remove ROM stockpile • Remove roadways • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Undertake contaminated site assessment and remediate where required • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	Other	• Drain and remove clean water dams • Undertake care and maintenance works as required

Domain	Sub-Domain	Closure Activities
2. Open-cut No. 2	2a. Final Void	• Reshape and stabilise overburden dumps • Stabilise and secure final void • Stabilise highwall • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Rehabilitated with appropriate vegetation cover as prescribed in the MOP • Implement groundwater monitoring program as required
	Other	• Remove internal haul roads • Rehabilitated with appropriate vegetation cover as prescribed in the MOP • Undertake care and maintenance works as required
3. Open-cut No. 3	3a. Administration area	• Removal of site services, i.e. electricity, telecommunications • Demolish buildings • Remove roadways and car parks • Backfill open drains • Dismantle sewerage treatment plant • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	3b. Final Void	• Reshape and stabilise overburden dumps • Stabilise and secure final void • Stabilise highwall • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Rehabilitated with appropriate vegetation cover as prescribed in the MOP • Implement groundwater monitoring program as required
	3c. ROM stockpile, crusher, reject bin, and dump hopper	• Removal of site services, i.e. electricity, telecommunications • Demolish equipment and fixed plant • Remove ROM stockpile • Remove roadways • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Undertake contaminated site assessment and remediate where required • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	Other	• Remove internal haul roads • Rehabilitated with appropriate vegetation cover as prescribed in the MOP • Undertake care and maintenance works as required
4. UG No. 4 and CPP	4a. Coal Handling Preparation Plant (CHPP)	• Removal of site services, i.e. electricity, telecommunications • Demolish buildings and fixed plant • Remove roadways around CHPP • Backfill open drains • Dismantle sewerage treatment plant • Drain and remove dirty water dams

Domain	Sub-Domain	Closure Activities
		• Remove gantries, conveyors and stackers • Remove product stockpile and seal reclaim tunnel • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Undertake contaminated site assessment and remediate where required • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	4b. Rail Loop and load out	• Removal of site services, i.e. electricity, telecommunications • Dismantle rail load out • Remove rail line and rail loop • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Undertake contaminated site assessment and remediate where required • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	4c. Administration and workshop area	• Removal of site services, i.e. electricity, telecommunications • Demolish buildings and fixed plant • Remove light and heavy vehicle wash pads • Remove roadways and car parks • Backfill open drains • Dismantle sewerage treatment plant • Remove fuel farm and waste oil/lubricant storage areas • Undertake minor earthworks to stabilise the site and maintain free draining to local watercourses • Undertake contaminated site assessment and remediate where required • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	4d. Access Road	• Remove access road • Rehabilitated with appropriate vegetation cover as prescribed in the MOP
	4e. Underground transport and conveyor portals and ventilation shaft	• Remove all fixed plant and equipment • Seal all portals and ventilation shafts • Secure portal areas
	Other	• Drain and remove clean water dams • Undertake care and maintenance works as required

5.5 PERFORMANCE AND COMPLETION CRITERIA

The performance and completion criteria are discussed in **Section 3.26**.

5.6 POST CLOSURE MONITORING AND MEASUREMENT

The following section outlines the current Monitoring and Measurement programs as well as providing direction on what future programs may be required both during the mine decommissioning period (i.e. between the cessation of mining and the closure of the mine) and the Post Closure period.

5.6.1 Current Monitoring and Measurement Programs

MCO has an established monitoring network that monitors and reports environmental data for the site. The following monitoring is currently undertaken for the MCO:

- Surface Water Monitoring Program;
- Groundwater Monitoring Program;
- Flora and Fauna Monitoring Program;
- Noise Monitoring Program;
- Blasting Monitoring;
- Air Quality Monitoring Program; and
- On-site Meteorological Monitoring.

5.6.2 Decommissioning Monitoring and Measurement Programs

Following closure of MCO, the Integrated Monitoring Network will be maintained until all decommissioning and rehabilitation works at the site have been completed. At this point those elements of the network that related specifically to MCO will be reviewed and rationalised in consultation with the appropriate authorities and in accordance with the Project Approval.

Notwithstanding this, there may be the need to establish some additional monitoring sites depending on the nature of the decommissioning works, and in response to finding possible sources of pollutants to the environment that currently may not be know (i.e. hydrocarbon contamination). The type and location of this monitoring will be determined during the decommissioning phase of the mine site.

5.6.3 Post Closure Environmental Compliance Monitoring and Measurement Programs

General Environmental Monitoring

After decommissioning works have been undertaken, whether progressive or final, a monitoring program will be designed to demonstrate that the completion criteria have been met and that the site is not resulting in any off site effects.

This period should also be used to plan for remedial action where monitoring demonstrates completion criteria are unlikely to be met. If progressive rehabilitation has been successful, with stabilisation and revegetation meeting completion criteria this last phase of closure may be shortened. It is, however, unlikely to be less than five years in duration (ANZMEC/MCA 2000).

The post closure monitoring and measurement program will be similar to that undertaken during operation of the mine only scaled back to focus on those aspects of the site that have the potential to cause pollution or is being used as an indicator to verify the success or failure of the rehabilitation works (e.g. blast and noise monitoring will not be required once all decommissioning and rehabilitation activities at the mine have ceased).

Table 24 provides a summary of the recommended post-closure monitoring and measurement that may be applicable to each of the management domains identified in this mine closure plan. It is recommended that the monitoring program be undertaken until such times that the data from monitoring demonstrates that the site is no longer contributing to, or has the potential to contribute pollutants to the surrounding environment, and that the landform and established vegetation is stable and sustainable.

Table 24: **Summary of Monitoring and Measurement Recommended for Post Closure**

Domain	Parameter	Possible Sampling / Monitoring Approach
1. Open-cut No.1	- Erosion and Sediment - Dust -Vegetation establishment - Biotic Activity - Water Quality - High Wall Stability	- Visual inspections (sediment), photos, sediment loading runoff/ erosion pins - Depositional Dust Gauges. - Transects, tree density, % cover, photos - Flora/Fauna survey. - pH, TDS, EC, metals, nutrients - Visual, photograph, inspections
2. Open-cut No. 2	- Erosion and Sediment - Dust -Vegetation establishment - Biotic Activity - Water Quality - High Wall Stability	- Visual inspections (sediment), photos, sediment loading runoff/ erosion pins - Depositional Dust Gauges. - Transects, tree density, % cover, photos - Flora/Fauna survey. - pH, TDS, EC, metals, nutrients - Visual, photograph, inspections
3. Open-cut No.3	- Erosion and Sediment - Dust -Vegetation establishment - Biotic Activity - Water Quality - High Wall Stability	- Visual inspections (sediment), photos, sediment loading runoff/ erosion pins - Depositional Dust Gauges. - Transects, tree density, % cover, photos - Flora/Fauna survey. - pH, TDS, EC, metals, nutrients - Visual, photograph, inspections
4. Underground No.4 and CHPP	- Erosion and Sediment	- Visual inspections (sediment), photos

Domain	Parameter	Possible Sampling / Monitoring Approach
	- Dust -Vegetation establishment - Biotic Activity - Water Quality	- Depositional Dust Gauges/ PM10 and TSP HVAS - Transects, tree density, % cover, photos - Flora/Fauna survey. - pH, TDS, EC, metals, nutrients

Rehabilitation Monitoring

Rehabilitation monitoring is addressed in **Section 3.25**.

5.7 FUTURE FINAL LAND USE OPTIONS

5.7.1 Final Land Use

Scope exists within the project to firmly establish long term future land use for those lands impacted as a consequence of mining. It is envisaged that land use in the Moolarben Creek valley will be a continuation of "broad acre" farms for those lands associated with Open Cuts No.2 and No.3.

At the conclusion of mining, Open Cuts No.2 and No.3 can be rehabilitated with grass and vegetation that permits livestock grazing and embellishment of vegetation that integrates with the adjoining north – south trending ridge lines. Significant improvements to existing remnant stands of vegetation can provide habitat linkages in north – south and east – west directions to increase the area's long term bio-diversity values and attributes.

The area's long term bio-diversity values can be achieved through the preparation and implementation of appropriate protection measures (e.g. VCA) linked to the title of the lands.

The surface area of the Underground No. 4 mine will be left intact whilst the main headings could be extended in a northerly direction beneath the Goulburn River to access the northern portion of EL 6288.

Infrastructure associated with the CHPP and Open Cut No.1 facilities may be utilised for future mining activities associated with the coal reserves of EL 6288.

In any event, the long term land use will be consistent with the land use provisions of the relevant Mid-Western Regional Council planning instrument and state environmental planning policies.

5.7.2 Final Void Use

Final void management is addressed in the FVMP in **Section 4.0**.

6.0 REVIEW, REPORTING AND AUDITS

6.1 REVIEW

The LMP will be reviewed by the MCO Environment and Community Relations Manager and, if necessary, updated following the occurrence of any of the below events:

- Where there is a reportable incident on site relating to the LMP;
- Five (5) years prior to mine closure to include a detailed mine closure plan;
- Within 3 months of changes to Project Approval or licence conditions relating to blast management or monitoring;
- Following an independent environmental audit which recommends changes to the LMP; and
- In response to a relevant change in technology or legislation.

The MCO Environment and Community Relations Manager (or delegate) will be responsible for the implementation of the LMP as well as the implementation of any revisions of the LMP resulting from consultation.

6.2 REPORTING

All internal and external reporting will be done in accordance with the MCO Environmental Management Strategy, which includes reporting within the AEMR. The AEMR will be prepared in accordance with Condition 5, Schedule 5 of the Project Approval, which requires:

"Within 12 months of this approval, and annually thereafter, the Proponent shall submit an AEMR to the Director-General and relevant agencies. The report must:

a) Identify the standards and performance measures that apply to the project;

b) Describe the works carried out in the last 12 months;

c) Describe the works that will be carried out in the next 12 months;

d) Include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;

e) Include a summary of the monitoring results for the project during the past year;

f) Include an analysis of these monitoring results against the relevant:

- *Impact assessment criteria/limits;*
- *Monitoring results from previous years; and*
- *Predictions in the EA;*

g) Identity any trends in the monitoring results over the life of the project;

h) Identify any non-compliance during the previous year; and

i) Describe what actions were or are being, taken to ensure compliance."

A summary of the monitoring and works undertaken in accordance with the LMP will be provided in the AEMR every year. The results of the monitoring will be compared against baseline criteria to

show the effectiveness of the rehabilitation program, and management of the offset areas on an ongoing basis.

Within 3 months of approval of this LMP, a copy will be made available to the CCC, relevant agencies and for public viewing via the MCO website.

A summary of the monitoring results will be made publicly available on the MCO website and updated every 3 months.

A report will be provided to SEWPAC in November each year detailing the compliance with the EPBC approval for activities over the previous 12 months.

6.3 AUDITS

Schedule 5, Condition 6 of DA 05–0117 requires MCO to commission an independent environmental audit of the project. Within 3 months of submitting the audit to the Director General of Planning, MCO will review and if necessary revise this management plan to the satisfaction of the Director General of Planning and Infrastructure.

An independent audit against the EPBC approval conditions (2007/3297) may be initiated by the Minister for Environment, Water and the Arts at any time. MCO will undertake an audit against these conditions if requested.

7.0 COMMUNITY COMPLAINTS PROCEDURE

MCO has developed a Community Complaints Procedure which details how to receive, respond to, and record and action any community complaints. MCO will record specific details relating to any community complaint including:

- The nature of the complaint;
- The method of the complaint, e.g. telephone;
- Monitoring results, including meteorological conditions at the time of the blast;
- Site investigation outcomes;
- Site activity and activity changes; and
- Any necessary actions assigned.

Records of complaints will be maintained in the Complaints Register database and kept on file for a period of no less than four years.

MCO maintains a 24 hour Community Response Line (1800 556 484) to respond to any complaints from neighbouring residents or interested stakeholders. The Community Response Line will be advertised in the local media on at least a quarterly basis and is also available on the MCO website and in the community newsletters.

Where possible complaints will be received directly, however, where recorded, complainants will be contacted within 24 hours of the initial complaint to gather additional information. A follow up on the complaint will be made within 3 days of the initial complaint to notify the complainant of actions taken.

Every effort will be made to address concerns in a manner that facilitates a mutually acceptable outcome for both the complainant and MCO. If required, the Independent Dispute Resolution Process will be entered into.

8.0 ROLES AND RESPONSIBILITIES

Table 25 summarises responsibilities documented in the LMP, and should be read in conjunction with this document. Responsibilities may be delegated as required.

Table 25: Landscape Management Plan Responsibilities

No.	Position	Tasks	Timing
1	**General Manager**	1. Provide adequate resources to implement requirements of the LMP	During budget planning
2	**Environment and Community Relations Manager**	1. Coordinate the respond to all land management related complaints in accordance with the Complaints Response Procedure	Following a complaint
		2. Provide training to all employees and contractors in environmental awareness, legal responsibilities and land management methods.	As required
		3. Consultation with Government Agencies regarding protection mechanisms	August 2011
		4. Coordinate a Social Impact Assessment for mine closure	5 years prior to closure
		5. Coordinate a Detailed Mine Closure Plan	5 years prior to closure
		6. Restrict access to offset and rehabilitation areas	As areas are revegetated and rehabilitated
		7. Dedicate lands to OEH	Complete
		8. Coordinate relevant reviews of the LMP	As required
3	**Environment and Community Relations Superintendent**	1. Oversee implementation of the LMP	As required
		2. Oversee all regulatory reporting in relation to the LMP	As required
		3. Oversee progressive site rehabilitation as final landforms become available	As required

No.	Position	Tasks	Timing
		4. Coordinate revegetation of EEC and native vegetation in offset areas	Ongoing until areas are revegetated and rehabilitated
		5. Coordinate flora and fauna monitoring program for the Offset Areas	As required in **Section 3.25**
		6. Evaluate results of monitoring programs and longer trends and where appropriate make changes to management	Post each monitoring program
		7. Approve Ground Disturbance Permits	As required
4	**Environment and Community Relations Coordinator**	1. Coordinate internal and external reporting on the performance of land management and rehabilitation	As per **Section 6.2**
		2. Coordinate pre-clearance surveys	Prior to land being cleared
		3. Coordinate seed collection	During clearing activities, where practical Ongoing on other lands
		4. Coordinate rehabilitation monitoring program	Annually
		5. Coordinate creek rehabilitation on Moolarben Creek to enhance the Alluvial Apple Forest	As part of rehabilitation activities for Open Cut 3
		6. Coordinate creek rehabilitation on Bora Creek	As part of rehabilitation activities for the Infrastructure Area
5	**Property Officer**	1 In conjunction with the ECRS, coordinate weed surveys of MCO lands	Annually
		2 In conjunction with the ECRS, coordinate weed control of MCO lands	As required
		3 In conjunction with the ECRS, coordinate feral animal surveys of MCO lands	Annually

No.	Position	Tasks	Timing
		4 In conjunction with the ECRS, coordinate feral animal control on MCO lands	As required
6	**Project Manager for projects requiring clearing**	1 Delineate areas to be disturbed	2-3 months prior to land being cleared
		2 Seek environmental assistance and sign-off for approval of Ground Disturbance Permit	As required
		3 Implement Vegetation Clearance Procedure	Prior to land being cleared
		4 Implement Fauna Management Strategies	Prior to land being cleared
		5 Implement Topsoil Management Strategies	Prior to topsoil being stripped Ongoing
7	**Commercial Manager**	1 Provide adequate financial provision for planned and unplanned rehabilitation for mine closure	Reviewed on an annual basis

9.0 REFERENCES

CSIRO (2008), *Implications of climate change for the National Reserve System,* report by CSIRO Sustainable Ecosystems to the Australian Greenhouse Office, Commonwealth Scientific, Industrial and Research Organisation, Canberra

DECC (2008), *New South Wales National Parks Establishment Plan 2008_Directions for building a diverse and resilient system of parks and reserves under the National Parks and Wildlife Act*, http://www.environment.nsw.gov.au/resources/protectedareas/0852npestplan.pdf

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http://www.environment.gov.au/biodiversity/threatened/publications/recovery/draft-for-comment-bggw.html

Department of Land and Water Conservation (1998) *Soil Landscapes of the Dubbo 1:250,000 Sheet*

DTI Guideline EDG03: – *Guidelines to the Mining, Rehabilitation and Environmental Management Process*; http://www.dpi.nsw.gov.au/minerals/environment/pgf.

Environmental Protection and Biodiversity Conservation Approval - EPBC 2007/3297

Florabank (2000), *Florabank Guideline 1 - Native seed storage for revegetation;*

Florabank Guideline 2 - Basic methods for drying, extraction and cleaning native plant seed;

Florabank Guideline 3 - Improving on basic native seed storage;

Florabank Guideline 4 - Keeping records on native seed;

Florabank Guideline 5 - Seed collection from woody plants for local revegetation ;

Florabank Guideline 6 - Native seed collection methods;

Florabank Guideline 7 - Seed production areas for woody native plants;

Florabank Guideline 8 - Basic germination and viability tests for native plant seed;

Florabank Guideline 9 - Using native grass seed in revegetation;

Florabank Guideline 10 - Seed collection ranges for revegetation

Minister of Planning (September 2007) *Project Approval – 05_0117 Section 75J of the Environmental Planning and Assessment 1979*

Moolarben Coal Mine Environmental Protection Licence (EPL) No. 12932.

Moolarben Coal Mine Exploration Licence EL6288.

Moolarben Coal Mine Exploration Licence EL7073.

Moolarben Coal Mine Exploration Licence EL7074.

Moolarben Coal Mine Mining Lease ML1605.

Moolarben Coal Mine Mining Lease ML1606.

Moolarben Coal Mine Mining Lease ML1628.

Moolarben Coal Mines Pty Ltd (2006), *Environmental Assessment Report*.

Moolarben Coal Risk Matrix (not dated)

Nichols (2005): "ACARP Project No. C13048 Development of Rehabilitation Completion Criteria for Native Ecosystem Establishment on Coal Mines in the Hunter Valley".

NPWS (2000): "Goulburn River National Park and Munghorn Gap Reserve: Vegetation Survey for Fire Management".

NPWS (2003): "Plan of Management for Goulburn River National Park and Munghorn Gap Nature Reserve".

NPWS (2004): "Final Fire Management Plan - Goulburn River National Park and Munghorn Gap Nature Reserve"

Redlands Council, 2002 *Fauna friendly Fencing: Fact Sheet REF 078*,

http://www.ruralresidentialliving.com.au/fencing/resource_downloads/Fauna_Friendly_Fencing.pdf

Resource Strategies Australia (2005): Wilpinjong Coal Project Environmental Impact Statement.

Standards Australia (2009): *ISO 31000:2009 Risk Management - Principles and Guidelines*.

10.0 ACRONYMS

AEMR	Annual Environmental Management Report
AMEEF	Australian Minerals and Energy Environment Foundation
ANZMEC	Australian and New Zealand Minerals and Energy Council
CA	Conservation Agreements
CCC	Community Consultation Committee
CHPP	Coal Handling And Preparation Plant
DA	Development Application
DTI	NSW Department of Trade and Investment
DP&I	NSW Department of Planning and Infrastructure
EA	Environment Assessment
ECRM	Environment and Community Relations Manager
EEC	Endangered Ecological Community
EPA	NSW Environment Protection Authority
EP&A Act	*Environment Planning and Assessment Act*
EPBC Act	Commonwealth *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*.
EPL	Environment Protection Licence

FVMP	Final Void Management Plan
GDE	Groundwater Dependant Ecosystems
GIS	Geographical Information Systems
GMP	Groundwater Monitoring Program
LMP	Landscape Management Plan
MCA	Minerals Council of Australia
MCO	Moolarben Coal Operations Pty Ltd
MCP	Moolarben Coal Project
MOP	Mining Operations Plan
Mtpa	million tonnes per annum
MWRC	Mid-Western Regional Council
NOW	NSW Office of Water
OC1, OC2, OC3	Open Cut 1, Open Cut 2, Open Cut 3
OEH	NSW Office of Environment & Heritage
POEO Act	*Protection of the Environment Operations Act 1997*
ROM	Run of Mine
ROMP	Rehabilitation and Offset Management Plan
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
SGRP	Surface and Groundwater Response Plan
SIA	Social Impact Assessment
SWMP	Surface Water Monitoring Program
TSC	NSW *Threatened Species Conservation Act*
TSU	Terrestrial Stratification Units
UG4	Underground mine
WMP	Water Management Plan
WBYBBRGW	White Box Yellow Box Blakely's Red Gum Grassy Woodland and derived native grasslands

Appendix 1: Statutory Requirements for Landscape Management and Rehabilitation

Consent/Licence	Condition	Requirement	Section
Project Approval 05_0117 Issued by the Department of Planning	Schedule 3, Condition 40	The Proponent shall progressively rehabilitate the site to the satisfaction of the DII, in general accordance with the proposed rehabilitation and offset strategy shown in Appendix 8.	3.0
	Schedule 3, Condition 41	Within 12 months of this approval, the Proponent shall make suitable arrangements to:	
		(a) transfer at least 135 hectares of the White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community to the Minister for Climate Change, Environment and Water to offset, on a "like for like" basis, the 65 hectares that would be cleared by the project at an offset ratio of 2:1; and	3.5
		(b) provide DECCW with funds (which at the discretion of DECCW may include an in-kind contribution) to cover any reasonable costs associated with the transfer and ongoing management of this land.	3.5
	Schedule 3, Condition 42	By the end of August 2011, the Proponent shall review its Rehabilitation and Offset Management Plan to include suitable arrangements to:	
		(a) conserve at least 6 hectares of existing White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community on Property 6 (Area 3 – Appendix 8)	3.4
		(b) conserve and enhance at least 2.6 hectares of regenerating White Box Yellow Box Blakely's Red Gum Grassy Woodland endangered ecological community on Property 6 (Area 3 – Appendix 8)	3.4
		(c) revegetate disturbed land with at least 48 hectares of White Box Yellow Box Blakely's Red Gum endangered ecological community on Properties 6, 10, 12, 13, 14 and 15 (Areas 1, 2 and 3 – Appendix 8);	3.4
		(d) revegetate at least 153 hectares of cleared land on properties 12, 13, 14 and 15 (Area 1 – Appendix 8) with suitable native vegetation;	3.4
		(e) conserve and enhance at least 1,282 hectares of existing native vegetation on Properties 6, 10, 12, 13, 14 and 15 (Areas 1, 2 and 3 – Appendix 8); and	3.4
		(f) make suitable arrangements to protect these offset areas in the long term, to the satisfaction of the	3.4

Consent/Licence	Condition	Requirement	Section
		Director-General and DECCW.	
	Schedule 3, Condition 43	The Proponent shall progressively landscape the environmental bunds on site.	3.5
	Schedule 3, Condition 44	The Proponent shall prepare and implement a detailed Landscape Management Plan for the project to the satisfaction of DII and Director-General. This Plan must:	Whole Plan
		(a) be prepared in consultation with DECCW and NOW by suitably qualified expert/s whose appointment/s have been approved by the Director-General;	1.0 Appendix 2
		(b) be submitted to the Director-General for approval prior to starting mining operations on site; and:	1.0 Appendix 2
		(c) include a: • Rehabilitation and Offset Management Plan; • Final Void Management Plan; and • Mine Closure Plan.	 3.0 4.0 5.0
	Schedule 3, Condition 45	The Rehabilitation and Offset Management Plan must include: (a) the rehabilitation objectives for the site, vegetation offsets and landscaping;	 3.4, 3.7, 3.8, and 3.9
		(b) a description of the short, medium, and long term measures that would be implemented to: • rehabilitate the site; • implement the vegetation offsets; and • landscape the environmental bunds;	 3.7, 3.8, 3.4 3.9
		(c) performance and completion criteria for the rehabilitation of the site, implementation of the vegetation offsets, and landscaping of the environmental bunds;	3.26

Consent/Licence	Condition	Requirement	Section
		(d) a detailed description of the measures that would be implemented over the next 3 years including the procedures to be implemented for: 1. progressively rehabilitating areas disturbed by mining; 2. implementing vegetation offsets; 3. reducing the visual impacts of the project; 4. protecting areas outside the disturbance areas; 5. rehabilitating creeks and drainage lines on the site (including Moolarben Creek) to ensure no net loss of stream length and aquatic habitat; 6. undertaking pre-clearance surveys; 7. managing impacts on fauna; 8. landscaping the site to minimise visual impacts; 9. conserving and reusing topsoil; 10. collecting and propagating seed for rehabilitation works; 11. salvaging and reusing material from the site for habitat enhancement; 12. • controlling weeds and feral pests; 13. • controlling access; 14. • bushfire management; and 15. • managing any potential conflicts between the offsite offset areas and Aboriginal cultural heritage,	1. 3.6 2. 3.4 3. 3.9 4. 3.10, 3.3 5. 3.7 & 3.14.3 6. 3.10 7. 3.11 8. 3.9 9. 3.12 10. 3.15 11. 3.18 , 12. 3.19, 3.20. 13. 3.21. 14. 3.23. 15. 3.24.
		(e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria (see (c) above);	3.25

Consent/Licence	Condition	Requirement	Section
		(f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and	3.3
		(g) details of who would be responsible for monitoring, reviewing, and implementing the plan.	8.0
	Schedule 3, Condition 46	The Final Void Management Plan must:	4.0
		(a) justify the planned final location and future use of the final void/s;	4.1
		(b) incorporate design criteria and specifications for the final void/s based on verified groundwater modelling predictions and a re-assessment of post-mining groundwater equilibration;	4.2
		(c) assess the potential interactions between creeks on the site and the final void/s; and	4.3
		(d) describe what actions and measures would be implemented to: • minimise any potential adverse impacts associated with the final void; and • manage and monitor the potential impacts of the final void until the mining lease for the project is relinquished.	4.4
	Schedule 3, Condition 47	The Mine Closure Plan must: (a) define the objectives and criteria for mine closure;	5.1, 5.5
		(b) investigate options for the future use of the site, including any final void/s;	5.7
		(c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the project; and	5.6
	Schedule 3, Condition 47	(d) describe how the performance of these measures would be monitored over time.	5.6
	Schedule 3, Condition 48	Within 3 months of the approval of the Landscape Management Plan, the Proponent shall lodge a bond with the Department to ensure that the vegetation offsets are implemented in accordance with the performance and completion criteria of the Landscape Management Plan. The sum of the bond shall be determined by calculating the full cost of implementing the vegetation offsets, and verified by suitably	3.4

Consent/Licence	Condition	Requirement	Section
		qualified quantity surveyor, to the satisfaction of the Director-General. *Notes:* • *If the vegetation offset is completed to the satisfaction of the Director-General, the Director-General will release the conservation bond.* • *If the vegetation offset is not completed to the satisfaction of the Director-General, the Director-General will call in all or part of the conservation bond, and arrange for the satisfactory completion of the relevant works.* • *If amendments to the Mining Act 1992 allow the Minister for Mineral Resources to require rehabilitation securities under a Mining Lease which apply to the implementation of rehabilitation works outside the boundary of a Mining Lease, the Proponent may transfer the vegetation offset bond required under this approval to the Minister of Mineral Resources provided the Director-General and the DII agree to the transfer.*	
EPBC 2007/3297 Issued by Commonwealth Department of Sustainability, Environment, Water, Population and Communities	1	In order to protect the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed ecological community, the person taking the action shall make suitable arrangements within 12 months of this approval to:	
		(a) transfer at least 130 hectares of the White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland listed ecological community to the NSW Minister for Climate Change Environment and Water to offset, on a "like for like" basis, the 65 hectares that would be cleared by the project at an offset ratio of 2:1; and	3.4
		(b) provide the NSW Department of Environment and Climate Change (DECCW) with funds (which at the discretion of DECCW may include an in-kind contribution) to cover any reasonable costs associated with the transfer and ongoing management of this land.	3.5
	2	In order to protect the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed ecological community, the person taking the action shall in accordance with the Rehabilitation and Offset Management Plan (See Condition 3 below):	

Consent/Licence	Condition	Requirement	Section
		(a) revegetate at least 38 hectares of disturbed land on the "Red Hills" property with Yellow Box-White Box-Blakely's Red Gum vegetation;	3.5
		(b) revegetate at least 143 hectares of cleared land on the “Red Hills” and other adjoining or adjacent properties with suitable native vegetation to improve wildlife corridor linkages	3.5
		(c) conserve and enhance at least 1262 hectares of existing native vegetation onsite; and	3.5
		(d) make suitable arrangements to protect these offset areas from development in the long term, to the satisfaction of tile Minister for the Environment and Water Resources (the Minister).	3.5
EPBC 2007/3297 Issued by Department of the Environment, Water, Heritage and the Arts	3	In order to protect the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed ecological community, the person taking the action shall prepare and implement a detailed Rehabilitation and Offsets Management Plan for the project to the satisfaction of the Minister for the Environment and Water Resources. The proponent shall progressively rehabilitate the site to the satisfaction of Minister for the Environment and Water Resources and the NSW Department of Primary Industries, in general accordance with the proposed Rehabilitation and Offset Management Plan. The Rehabilitation and Offset Management Plan must include:	3.0
		(a) the rehabilitation objectives for the site, vegetation offsets and landscaping;	3.4, 3.8, 3.9
		(b) a description of the short, medium, and long term measures that would be implemented to: • rehabilitate the site; • implement the vegetation offsets; and • landscape the environmental bunds;	3.4, 1.1, 3.8
		(c) performance and completion criteria for the rehabilitation of the site, implementation of the vegetation offsets, and landscaping of the environmental bunds;	3.26
		(d) a detailed description of the measures that would be implemented over the next 3 years including the progressive rehabilitation of mining areas and progressive implementation of the vegetation offset	3.4, 1.1, 3.8, 3.9

Consent/Licence	Condition	Requirement	Section
		areas referred to in Condition 2.	
		(e) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria (see (c) above);	3.25
		(f) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and	3.3
		(g) details of who would be responsible for monitoring, reviewing, and implementing the plan.	8.0
		Coal mining operations must not commence until the plan has been approved. The approved plan must be implemented.	
	4	In order to protect the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed ecological community, the person taking the action must, by 1 November each year after the commencement of operations, provide a certificate stating that they have complied with the conditions of approval.	6.2
	5	Upon the direction of the Minister, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.	6.3
EPBC 2007/3297 Issued by Commonwealth Department of Sustainability, Environment, Water, Population and Communities	6	If the Minister believes that it is necessary or desirable for the better protection of the listed threatened species and ecological communities to do so, the Minister may request that the person taking the action make specified revisions to the plans, reports or management strategies approved pursuant to paragraphs 1, 2, and 3, and submit the revised plan, report or strategy for the Minister's approval. The person taking the action must comply with any such request. The revised approved plan, report or strategy must be implemented.	6.1
	7	If at any time after 5 years from the date of this approval, the Minister notifies the person taking the action in writing that the Minister is not satisfied that there has been substantial commencement of	6.0

Consent/Licence	Condition	Requirement	Section
		coal mining operations, the action must not thereafter be commenced without the written agreement of the Minister.	
ML1605	7	Disturbed land must be rehabilitated to a sustainable/agreed land use to the satisfaction of the Director-General.	3.6
ML1606	7	Disturbed land must be rehabilitated to a sustainable/agreed land use to the satisfaction of the Director-General.	3.6
ML1628	7	Disturbed land must be rehabilitated to a sustainable/agreed land use to the satisfaction of the Director-General.	3.6

Appendix 2: Government Department Correspondence

NSW GOVERNMENT Planning & Infrastructure

Development Assessment Systems & Approvals
Mining Projects

Contact: Sara Wilson
Phone: 9228 6583
Fax: 9228 6466
Email: sara.wilson@planning.nsw.gov.au

Our Ref: 10/23138-2

Luke Bowden
Environment and Community Relations Manager
Moolarben Coal Operations Pty Ltd
Locked Bag 2003
MUDGEE NSW 2850

Dear Mr Bowden

MOOLARBEN COAL MINE (MP 05_0117)
Landscape Management Plan

The Department has reviewed the Landscape Management Plan (LMP) (June 2013) for the Moolarben Coal Project – Stage 1, which was prepared in accordance with condition 44 of Schedule 3 of the Project Approval (MP 05_0117), and has been updated to incorporate the Surface Infrastructure Area, Open Cut 1, Open Cut 2 and Open Cut 3.

It is noted that the LMP also included the following plans:

- Rehabilitation and Offset Management Plan (condition 45 of Schedule 3);
- Final Void Management Plan (condition 46 of Schedule 3); and
- Mine Closure Plan (condition 47 of Schedule 3).

The Department is generally satisfied with the content and structure of the plans. However, prior to approval of the plans, the Department requests that Moolarben Coal Operations Pty Ltd (MCO) update the plans to address the issues detailed in **Attachment 1**.

If you require any more information, please call Sara Wilson on 9228 6583.

Yours sincerely

Howard Reed

Howard Reed 30.9.13
Manager
Mining Projects
as nominee of the Director-General

ATTACHMENT 1
REVIEW OF LANDSCAPE MANAGEMENT PLAN – JUNE 2013

- It is noted that several of the inherent risk ratings in column 4 of Table 12 have changed when compared to the previously approved LMP. Several ratings have been reduced from High Risk to Medium Risk, and in one case the rating has changed from Extreme Risk to Low Risk. The Department asks whether an updated risk assessment has been undertaken and requests a full justification of the changed risk ratings.
- Section 3.5 should include more detailed information on the timing for implementation of each of the key management strategies for the revegetation of the offset areas.
- Condition 45 (b) and (c) require descriptions of measures to landscape the environmental bunds and performance and completion criteria for the landscaping of the bunds. Section 3.9 provides insufficient detail to satisfy this condition.
- Section 3.13 – the last dot point (which related to the planting of appropriate groundcover species) has been removed from this latest version and should be reinserted.
- Section 3.18 – the Department requests justification for removal of the commitment to use nesting boxes from the habitat augmentation structures.
- Section 3.20 – this section discusses designing and implementing a pest control program. It should be updated to include details of the program, including what pest control measures are/will be implemented, timing of follow up inspections, etc.
- Section 3.23 – this section refers to a Bushfire Management Plan. In order to satisfy the requirements of condition 45(d), this plan should be appended to the LMP.
- It is noted that the preliminary performance and completion criteria for both rehabilitated lands and revegetated offset areas have changed from the previously approved LMP, specifically in relation to stem densities. It is also noted that the previously approved and existing LMP commits MCM to researching and agreeing on completion criteria within 5 years, which equates to early 2015. It is recommended that the timing of this research is advanced, based on the results of existing rehabilitation and revegetation works, and that OEH is consulted to develop appropriate final criteria. This process (including timing) should be detailed in this version of the LMP.
- It is noted that Section 4.0 – Final Void Management Plan (required in accordance with condition 46 of Schedule 3) may shortly be outdated, due to the changed final void arrangements described in Stage 1 MOD 9. The Department is satisfied that this section can be updated following approval of this modification.

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11 October 2013

Howard Reed
Department of Planning and Infrastructure
GPO Box 39
Sydney NSW 2001

Dear Howard

Moolarben Coal Operations Landscape Management Plan

Moolarben Coal Operations Pty Ltd (MCO) refers to a letter from Department of Planning and Infrastructure (DP&I) dated 30/09/13 regarding comments on the Landscape Management Plan (LMP) that has been updated to incorporate the Surface Infrastructure Area, Open Cut 1, Open Cut 2 and Open Cut 3.

MCO have addressed DP&I's comments with Table 1 of this letter showing how each of DP&I's comments have been addressed. Attached to this letter is an updated version of the LMP with the changes made highlighted for DP&I's review.

If you have any further questions regarding this LMP please contact Julie Thomas on 02 6376 1511 or 0427 228 412.

Yours sincerely,

Luke Bowden
Environment and Community Relations Manager

MOOLARBEN COAL OPERATIONS PTY LTD, PART OF THE YANCOAL AUSTRALIA GROUP

Table 1: MCO's Response to DP&I's Comments on LMP

No.	DP&I Comments	MCO Response
1	It is noted that several of the inherent risk ratings in column 4 of Table 12 have changed when compared to the previously approved LMP. Several ratings have been reduced from High Risk to Medium Risk, and in one case the rating has changed from Extreme Risk to Low Risk. The Department asks whether an updated risk assessment has been undertaken and request a full justification of the changed risk ratings.	An updated risk matrix has been used in the revised management plan, which has changed the numbers in the risk rating, however, the inherent risk rating in column 4 of Table 12 hasn't changed between the approved and revised LMP's. The numbers have been removed from column 4 of Table 12 to avoid further confusion.
2	Section 3.5 should include more detailed information on the timing for implementation of each of the key management strategies for the revegetation of the offset areas.	Section 3.5 has been updated to provide more detailed information on when the implementation of these strategies commenced. Additional information has been added on the progress of the revegetation program.
3	Condition 45 (b) and (c) require descriptions of measures to landscape the environmental bunds and performance and completion criteria for the landscaping of the bunds. Section 3.9 provides insufficient detail to satisfy this condition.	Information has been added to Section 3.9 to indicate that the environmental bunds are managed as part of the rehabilitation program for their respective open cuts and aren't managed as a separate program. Information has also been added to Section 3.7 and 3.8 to support this.
4	Section 3.13 – the last dot point (which related to planting of appropriate groundcover species) has been removed from this latest version and should be reinstated.	This dot point was removed as there is no land in Open Cut 1, Open Cut 2 or Open Cut 3 that would benefit from this work. All of Open Cut 1 has now been cleared and the footprints of Open Cut 2 and Open Cut 3 are fully vegetated with no areas of bare land that would benefit from planting of groundcover.
5	Section 3.18 – The Department requests justification for removal of the commitment to use nesting boxes from the habitat augmentation structures.	A recent study by Ecological has found that there are adequate hollow bearing resources in the Offset Areas. Based upon this study MCO don't need to augment the hollow bearing resources in the area.
6	Section 3.20 – this section discusses designing and implementing a pest control program. It should be updated to include details of the program, including what pest control measures are/will be implemented, timing of follow up inspections, etc.	Section 3.20 has been updated to include more details about the program including control measures and follow up inspections.
7	Section 3.23 – this section refers to a Bushfire Management Plan. In order to satisfy the requirements of condition 45 (d), this plan should be appended to the LMP.	The Bushfire Management Plan addresses safety concerns and protection of assets as well as biodiversity issues, so the full plan is not relevant to the LMP. The commitments in the approved management plan have been reinstated and reviewed against the Bushfire Management Plan for consistency.
8	It is noted that the preliminary performance and completion criteria for both rehabilitated lands and revegetated offset areas have changed from the previously approved LMP, specifically in relation to stem densities. It is also	The preliminary performance and completion criteria have been reviewed and updated as per the process identified in Figure 7. Monitoring data and site experience were used during this review.

	noted that the previously approved and existing LMP commits MCM to researching and agreeing on completion criteria within 5 years, which equates to early 2015. It is recommended that the timing of this research is advanced, based on the results of existing rehabilitation and revegetation works, and that OEH is consulted to develop appropriate final criteria. This process (including timing) should be detailed in this version of the LMP.	The monitoring programs for the rehabilitation and offset areas are still in their infancy so MCO feel that more time is required to identify trends in the results and that the intent of the 5 year window was for 5 years after rehabilitation or revegetation commenced. Information has been added to the LMP to indicate that criteria for rehabilitation areas will be developed in consultation with Department of Resources and Energy through the Mining Operations Plan process and criteria for offset areas will be developed in consultation with OEH. Timeframes for this development have been added to the LMP.
9	It is noted that Section 4.0 – Final Void Management Plan (required in accordance with condition 46 of Schedule 3) may shortly be outdated, due to the changed final void arrangements described in Stage 1 MOD 9. The Department is satisfied that this section can be updated following approval of this modification.	These comments are noted.