



Duralie Coal Mine Annual Biodiversity Report 2020

FOR THE YEAR ENDING 30 JUNE 2020

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1 INTRODUCTION

The Duralie Coal Mine (**DCM**), located in the Southern part of the Gloucester Basin NSW, is approximately 30 kilometres south of Gloucester and is owned and operated by Duralie Coal Pty Ltd (**DCPL**), a fully owned subsidiary of Yancoal Australia Limited (**YAL**).

1.1 Scope

In accordance with the Duralie Extension Project, Project Approval 08_0203 (as modified December 2014), the proponent (DCPL) is required in accordance with *Schedule 3, condition 43* to prepare and implement a Biodiversity Management Plan (BMP). This Plan must include a:

“a program to monitor and report on the effectiveness of the measures in the Biodiversity Management Plan and conditions 33-43 of this approval, and the performance of the Offset Strategy, with summary reporting to be carried out annually and comprehensive reporting every three years following the independent environmental audit”.

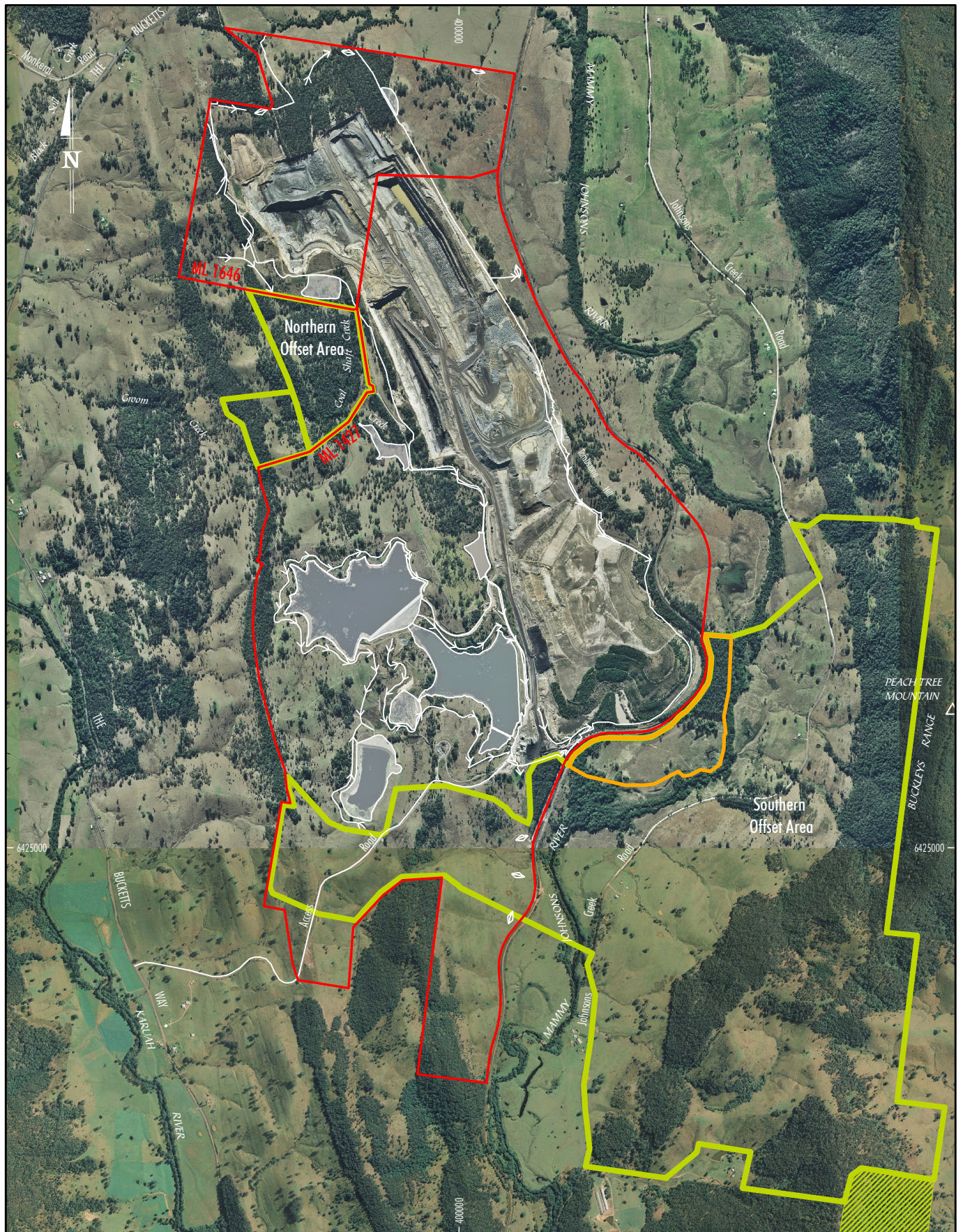
This DCM Annual Biodiversity Report provides a review of the effectiveness of measures in the BMP for the annual year ending 30 June 2020 in accordance with Section 7.2 of the BMP. The scope of the review includes the Mining Lease area ML1427 and ML1646 and Biodiversity Offset areas as indicated on Plan A.

This report (and associated Appendices) is included as an Appendix of the DCM Annual Review which is available on the Duralie Coal website www.duraliecoal.com.au.

During the previous reporting period a revised BMP was submitted to the NSW Department of Planning and Environment (DP&E) and approved on **25 January 2019 (Appendix A)**. Following the DCM Independent Environmental Audit undertaken in **December 2017** a revision of the BMP was prepared for the three-year period between August 2018 and July 2021 and includes broader concepts for the longer term (6+ years) management since commencement of the BMP in 2012. The key changes to the BMP include relevant updates to the performance and completion criteria tables with consideration to the works which have been completed to date.

2 STATUS OF BMP PERFORMANCE CRITERIA

Performance criteria as prescribed in the BMP is presented in **Tables 1 to 10**. The performance criteria have been developed to meet the specific objectives for the areas described in Section 2 of the BMP. All performance criteria are linked to the management specifications listed in the BMP Section 5 and Section 6, and monitoring/reporting specifications in the BMP Section 7. The status of BMP performance criteria is provided in the subsequent sections of this report.



LEGEND

- Mining Lease Boundary
- Approximate Extent of Project Major Surface
- Offset Area
- Bowens Road North Offset Area
- Private Land Under Conservation Agreement

0 1000
Metres
GRID DATUM MGA 94 ZONE 56

Source: DCPL (2014); AAHatch - Aerial Photography flown April 2009 and July 2013

BIODIVERSITY MANAGEMENT PLAN

FIGURE 3

Location of the Offset Areas



3 VEGETATION CLEARANCE PROTOCOL

3.1 Vegetation Clearance Report

Vegetation clearance is undertaken in accordance with the BMP Section 5.4 Vegetation Clearance Plan. Prior to any clearance operations a Clearing Plan is prepared, and vegetation pre-clearance surveys are undertaken.

Vegetation clearance for the Duralie Extension Project was finalised in 2017. During the 2019/2020 reporting period, no vegetation clearance was undertaken.

The area of disturbance at the end of June 2020 is shown in the DCM Annual Review 2020 Figure 4 (Appendix B).

Information obtained during vegetation clearance activities (i.e. habitat features, hollows cleared and fauna observed) has been used to determine the requirements for nest box replacement in the biodiversity offset areas (refer Section 4).

3.2 Salvaged and Reused Material for Habitat Enhancement

Section 5.8 of the BMP requires salvaged material from vegetation clearance activities to be used for habitat enhancement within the revegetation or rehabilitation areas. Habitat features such as trunks, logs, large rocks, branches, stumps and roots are salvaged and relocated where practicable. As there was no vegetation clearance undertaken during the reporting period, no further habitat materials were salvaged.

During previous reporting periods cleared vegetation was managed as follows:

- Suitable trees and stumps salvaged and stockpiled for reuse.
- Mulched vegetation stored in stockpiles and used on the rehabilitation and incorporated into topsoil.

4 NEST BOX PROGRAM

Nest box management is undertaken in accordance with the BMP Section 6.4. Nest boxes will be installed to provide habitat opportunities in the short to medium-term for a number of arboreal fauna species including the Squirrel Glider.

Table 1: Nest Box Program Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
Nest box strategy including target species, habitat trees/feature, nest box designs maintenance and monitoring	Nest box plan developed following habitat assessment and pre-clearance surveys (Section 5.4).		
Nest box installation Includes installation of 18 Squirrel Glider boxes, however may be expanded as required.	Hollow bearing habitat features (nest boxes) installed (Section 6.4).		Nest boxes installed.

Maintenance and monitoring of installed nest boxes. Including monitoring for European bee invasion and repair/replacement	Monitoring in autumn and spring completed. Maintenance undertaken where required (Sections 6.4 and 7.1).	Annual nest box monitoring and maintenance (Sections 6.4 and 7.1).	Nest boxes monitored and maintained, being replaced where required.
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Legend	Not commenced	In progress	Completed
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AMBS Ecology & Heritage (AMBS) was commissioned to implement the Nest Box Program as described in the BMP Section 5.4.2 and Section 6.4. The Nest Box Program consists of two main components:

- Replacing 18 boxes specifically targeting the Squirrel Glider; and
- Replacing boxes on a like for like basis for any hollow bearing trees cleared during vegetation clearance operations (refer to Section 3).

The installation of nest boxes has occurred over five periods with the most recent installation in **October 2019**. No further nest box installations were required resulting from vegetation clearance activities. During the reporting period 26 nest boxes were installed in the rehabilitation areas for additional habitat enhancement. A further 9 Feathertail Glider boxes were installed in the offset area to replace the existing unoccupied Feathertail Glider nest boxes with a design that is likely to be more successful within the study area for occupation by fauna. The next monitoring is scheduled for September 2020.

The current program involves:

- 18 nest boxes targeting the Squirrel Glider (*Petaurus norfolcensis*), installed during February 2013;
- 106 nest boxes targeting a variety of hollow-dependent species, installed during August 2013;
- 45 nest boxes targeting a variety of hollow-dependent species, installed during September 2014;
- 42 nest boxes targeting a variety of hollow-dependent species, installed during September 2016.
- 26 nest boxes targeting a variety of hollow-dependent species that were installed in the Rehabilitation Area between 16 October 2019 and 18 October 2019; and
- 9 nest boxes targeting the Feathertail Glider (*Acrobates pygmaeus*) that were installed during September and October 2019.

An annual nest box monitoring report was completed by AMBS in **September 2019** (Appendix C).

The 2018 - 2019 Nest Box Programme for the Duralie Offset Area Report (AMBS June 2019) summarises the work undertaken in relation to the Nest Box Programme for the Duralie Offset Area between October 2018 and September 2019, in accordance with the Duralie Coal Mine Biodiversity Management Plan (BMP). Works undertaken and other milestones that took place during this period included yearly monitoring of 210 nest boxes that have been installed between February 2013 and September 2016. One new Feathertail Glider (hardwood) nest box design was installed in September 2019.

A summary of results from the 2019-2020 report is provided below.

"Fifteen species were recorded or shown signs of previous occupation during the current reporting period, including the Squirrel Glider, Sugar Glider, Feathertail Glider, Brush-tailed Phascogale, Brown Antechinus, Common Brushtail Possum, Common Ringtail Possum, Gould's Wattled Bat, Chocolate Wattled Bat, Gould's Long-eared Bat, Australian Wood Duck, Masked Owl, White-throated Treecreeper, Lace Monitor, and an unidentified snake (scat). The record of the Chocolate Wattled Bat is the first for the Nest Box Programme. Species recorded previously but not during the current reporting period include the Bush Rat [probable], Mountain Brushtail Possum, Lesser Long-eared Bat, a Free-tailed Bat, Australian King-Parrot, Australian Owlet Nightjar, Eastern Rosella, Peron's Tree Frog, Common Tree Snake

and Diamond/Carpet Python). Twenty-four vertebrate species have now been recorded within nest boxes during the Nest Box Programme.

Three of the species recorded utilising the nest boxes are listed as vulnerable under the NSW Biodiversity Conservation Act 2016 (BC Act), the Squirrel Glider, Brush-tailed Phascogale and Masked Owl.

The majority of nest boxes were in good condition, although one nest box required replacing during September 2019, the Rosella nest box at B7. Minor degradation was noted on several other nest boxes, such as peeling or splitting of the plywood, slight warping of the lid, disintegration of the brace plate, chewing of entrance holes, small cracks on the outside of the nest box, and moisture appearing inside the nest box. Eight nest boxes are likely to require replacing during the next monitoring survey.

Signs of the European Honey Bee were recorded at five nest boxes, but no bees were present at the time of the survey. Termite activity was observed at one nest box.

Overall, a total of 186 out of 210 nest boxes, or approximately 88%, have been occupied or shown signs of occupancy since their installation. This includes 100% of the Squirrel Glider nest boxes installed in February 2013, 86% of the additional nest boxes installed in August 2013, 93% of the additional nest boxes installed in September 2014, and 85% of the additional nest boxes installed in September 2016.

Occupancy of nest boxes has generally increased over time until the previous few years when occupation rates have remained relatively constant. However, for some nest boxes there has been a noticeably decrease in occupation during September 2019, which is likely due to record low rainfall and extreme drought conditions. The record low rainfall experienced in the study area would negatively affect local animal populations, in particular reducing abundance and reproductive success, which is likely why we observed fewer signs of animals within nest boxes in September 2019.

There are at least ten microbat nest boxes which have been installed for approximately six years and have not been occupied or shown signs of occupancy. Given other nest boxes with the same design have been occupied in other locations in the offset areas, we recommend relocating these nest boxes in an attempt to increase occupation rates."



Plate 1 - Sugar Gliders (*Petaurus norfolcensis*)



Plate 2 – Masked Owl at B18 nestbox (*Tyto novaehollandiae*)

5 WEED CONTROL AND MONITORING

Weed control is undertaken in accordance with the BMP Section 5.9 and Section 6.5. The weed control program aims to manage weeds to minimise their impact on native flora and fauna.

Table 2: Weed Control Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
Weed Control/treatment program in remnant enhancement and regrowth management VMUs	Primary woody weed control (Sections 5.9 and 6.5). Primary control of priority target weeds described in Sections 5.9 and 6.5 commenced. Follow-up woody and priority weed control undertaken as per Sections 5.9 and 6.5.	Follow-up woody and priority weed control undertaken as per Sections 5.9 and 6.5.	Target/priority weed coverage within offset VMUs reduced by 90%.
Weed control/ management in Installation (revegetation) VMUs	Pre-cultivation spraying in all installation VMUs undertaken including control of exotic Sporobolus and fireweed (Figure 7 and Section 6.11). Second cultivation spray in all installation VMUs undertaken including control of exotic Sporobolus and fireweed where necessary (Section 6.11). Additional pre-planting weed treatment in all installation VMUs undertaken if required (Section 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11.	Additional pre-planting weed treatment in all installation VMUs undertaken if required (Section 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11.	Control of competitive plants within revegetation areas until maintenance phase (detailed in Section 6.11) is complete i.e. 90% of canopy and shrub species have survived 12 months after planting including replanting of lost species.
Monitoring and reporting	Monitoring and documentation of weed species, occurrence and densities a per Section 7.1.	Monitoring and documentation of weed species, occurrence and densities as per Section 7.1.	Monitoring and reporting undertaken.

The general procedure for controlling weed involves:

- Monitoring to identify locations and densities of priority weed;
- Identification of suitable control measures;
- Implementation of the selected control measure by a suitable qualified person; and
- Follow-up inspections to evaluate effective of weed control.

Weed spraying activities are generally undertaken between the months of September and April each year. Physical management measures such as mechanical removal, slashing and/or back-burning can be undertaken at other times of the year as required.

Greening Australia were contracted to undertake an initial weed assessment of the offset area in August 2013. The aim of the weed assessment was to assist in setting priorities and developing on-ground actions for weed control and is presented in the form of a mapping survey. The mapping survey provides reference to individual weed infestations within each Vegetation Management Unit (VMU) for the biodiversity offset area. Each weed occurrence was allocated a priority ranking based on the species status i.e. noxious or agricultural, and the size and density of the infestation. The survey information contributed to the development of a strategic approach to the control of priority weeds and allow contractors to locate

infestations using the mapping files. Additionally, it will continue to assist in tracking weeds to gauge the effectiveness of control measures and the potential spread and future distribution.

A contractor is engaged at the DCM to undertake weed management activities on an ongoing basis. Follow-up weed treatment of all remnant enhancement and regrowth management VMUs recommenced in **October 2019** and continued through to **April 2020**. The key species targeted included blackberry, lantana, privet, wild tobacco and Giant Parramatta grass.

Weeds monitoring to evaluate the effectiveness of control measures is undertaken in conjunction with the annual vegetation monitoring and is documented in the *Duralie Coal Mine Biodiversity Offsets Monitoring Report 2020* (Appendix F).

The 2020 monitoring report indicates that:

Woody weeds were observed and recorded throughout the offset area. Non-fire affected VMUs recorded large brambles of blackberry, and in the alluvial flat VMUs (VMU AD, F, S and Y), privet and wild tobacco were also observed. In the fire affected VMUs, blackberry was observed to be re-growing from rootstock, while the dense lantana thickets that were encountered in previous surveys were burned away and were not observed to be re-growing. However, blackberry, lantana and wild tobacco were still common in the gullies.

Recommendation:

- *Targeted weed control in the remnant patches to prevent damage to the re-establishing native vegetation, with more widespread control works elsewhere.*

6 FERAL ANIMAL CONTROL AND MONITORING

Feral animal control is undertaken in accordance with the BMP Section 5.10 and Section 6.5. The objective of feral animal control program is to manage feral animals to minimise their impact on native flora and fauna in the Biodiversity Offset Areas or the impact on agricultural production in other surrounding areas.

Table 3: Feral Animal Management Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
Feral animal control program	Initial study undertaken.	Feral animal control as required.	Feral animal numbers within offset areas minimised as evidenced through monitoring data.
Monitoring and reporting	Monitoring and documentation of feral animal species undertaken.	Monitoring undertaken.	-

AMBS was commissioned to undertake the initial invasive animal survey, in accordance with Section 5.10 of the BMP in 2013. The objective of the study was to determine the range of invasive animals that occur or are likely to occur within the DCM and offset areas and provide recommendations for invasive animal control.

MDP Vertebrate Pest Management has been engaged by DCPL since 2016 to implement feral animal control programs across property owned by DCPL including both the Stratford & Duralie Mining Leases and the Stratford & Duralie Biodiversity Offset Areas. During the reporting period wild dog and fox control was undertaken between **October 2019** to

November 2019 and March 2020 to April 2020. The program involved a combination of trapping and shooting. The programs were productive with a total of 15 wild dogs and 7 foxes trapped and shot over the control programs.



Plate 3 – Wild Dog



Plate 4 – Wild Dog

In accordance with the BMP Section 5.10 a follow-up feral animal monitoring survey was undertaken by AMBS Ecology & Heritage during **April 2017** to monitor the success of control programs and determine priorities for ongoing control measures. The feral animal survey covered the Duralie Mining Lease and Duralie Biodiversity Offset Area.

An extracted summary of the survey results from the *Invasive animal study of the Duralie Coal Mining Lease and Offset areas, Gloucester Valley* (September 2017) is provided below (Appendix D).

The results of the current invasive animal survey were similar to those from the initial invasive animal survey in 2013. A total of 14 invasive species have been recorded in the study area in the past or during recent surveys or are considered to have potential to occur. Eleven of these species were either not recorded or were recorded in very low numbers during the current surveys and are of little concern at the current time. These include the Common Starling, House Sparrow, Mallard, Rock Dove, Spotted Turtle-Dove, House Mouse, Black Rat, Brown Hare and Deer. In accordance with the BMP the abundance of these species should be monitored every two years to determine if future controls are necessary.

Four species of invasive animal were repeatedly recorded in the study area and are a potential threat to native biodiversity. These are the Fox, Feral Cat, Rabbit and the Common Myna. Wild Dogs were also recorded in the study area. Wild Dogs are mostly seen as an agricultural threat, preying on sheep, calves and other livestock (Fleming et al. 2001). They are not generally considered to have severe negative impacts on biodiversity, although this topic has not been well studied.

In summary:

- *Foxes and Feral Cats may represent a threat to biodiversity within the study area;*
- *Wild Dogs are present in the study area, and while they may or may not be a threat to biodiversity, are currently a declared pest species;*
- *The European Rabbit is present at low densities, but its abundance can increase rapidly, particularly if dog, fox and cat numbers decrease, and it is also a declared pest species;*
- *The abundances of all of the above species within the study area are likely to be inter-related.*

It is therefore recommended that if control measures for Wild Dogs and/or European Rabbits are implemented in order to comply with the Pest Control Order, that any such control measures should be implemented together with control measures for Foxes and Feral Cats, in a co-ordinated manner, and the impacts monitored. Pest control in the study area should be considered in the context that the study area represents a small part of a much broader region. Pest control in the study area alone is likely to be of only temporary and limited benefit, unless carried out in a broader area in conjunction with other landholders, and carried out over the medium to long term.

A feral animal survey of the Duralie Mining Lease and Duralie Biodiversity Offset Area will be undertaken again during the next reporting period. Feral animal monitoring will guide the ongoing management efforts for controlling feral animals.

7 CONTROLLING ACCESS AND MANAGING GRAZING

Controlling access and managing grazing is undertaken in accordance with the BMP Section 5.11, 6.6 and 6.7.

Table 4: Managing Grazing and Agriculture Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
Managing grazing and agriculture	Livestock excluded from the Offset through installation of gates and fencing illustrated in Figure 9 (Section 6.7).		Livestock excluded from the offset.
Monitoring and maintenance of fencing and gate infrastructure	Monitoring of gates and fencing to exclude livestock. Where required, maintenance undertaken and documented (Section 7.1).	Monitoring of gates and fencing to exclude livestock. Where required, maintenance undertaken and documented (Section 7.1).	Gates and fencing monitored and maintained.

Table 5: Controlling Access Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	CC
Operational Review to facilitate site access for offset management activities including installation, inspection and bushfire management	Operational Review developed. Review includes road, fire trail and culvert construction and requirements for fencing and revegetation cultivation/site preparation ² . Maintenance activities, particularly track maintenance and slashing have been considered (Section 6.7, plus related Sections 6.9 and 6.5).		Operational Review undertaken and outcomes implemented.
Community and stakeholder engagement	Assessment of surrounding landholders and the local community to evaluate opportunities for participation in implementation of this Biodiversity Management Plan undertaken. Local council consultation has commenced regarding placement of signage on the Johnson's Creek Road bisect area of the Offset (see Figure 9 for location) (Section 6.7). Signage has been installed on the Johnson's Creek Road bisect area of the Offset to alert drivers of potential fauna on the roads.		Opportunities for landholder and community participation in the BMP identified. Local council consulting regarding signage. Signage installed on Johnsons Creek Road.
Infrastructure including access tracks, fencing, fire trails and culverts	Access tracks, fire trails, firebreaks, fencing and culverts have been completed as per Figure 9 and the Operational Review ² (Section 6.7).		Access related infrastructure identified in the Operational Review and completed.

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	CC
Monitoring and maintenance of infrastructure including tracks, fire trails, signs, culverts and fences.	Monitoring and maintenance of all access tracks and fire trails has been undertaken ² (Sections 6.7, 6.9 and 7.1).	Monitoring and maintenance of all access tracks, fire trails and warning signs has been undertaken ² (Sections 6.7, 6.9 and 7.1).	Regular monitoring and maintenance program for roads, tracks, fire trails, signs, fences and culverts.

The implementation of the BMP management measures commenced in 2013. The BMP requires works to be undertaken to exclude livestock and control access to the Biodiversity Offset Areas.

Installation works to control access and manage grazing in the offset areas was completed in 2014. During the reporting period contractors were engaged to undertake maintenance activities on access tracks, culverts, gates and fences. The works included slashing of tracks, firebreaks and repairs to damaged gates and culverts. Additional signage was also installed on the key access points to the Biodiversity Offset Areas.

The *Duralie Coal Mine Biodiversity Offsets Monitoring Report 2020* (Appendix F) found some internal fencing was damaged at several locations in the fire affected VMUs, either directly or by falling trees and branches. In the non-fire affected VMUS, fencing was generally in good condition. There were no signs of livestock at the time of the survey, however there was some evidence of previous access by cattle in several areas.

Livestock continue to be excluded from the Biodiversity Offset areas with the exception of 'crash grazing' programs in preparation for revegetation activities following a field assessment by a qualified consultant. However, during inspections of the Biodiversity Offset area, cattle were identified to have entered through damaged fencing on the eastern and northern boundaries. The cattle were removed and maintenance work was undertaken to repair the fencing.

Roadside Flora and Fauna signage has been installed in accordance with advice from Great Lakes Council and with regard to Australian Standard AS1742.2. Further correspondence was held with GLC Ecologist in 2015 regarding future requirements for traffic controls within the offset areas.



Plate 5 – Biodiversity Offset fencing and signage

8 BUSHFIRE MANAGEMENT

Bushfire management is undertaken in accordance with the BMP Section 5.12 and Section 6.9. The objective of bushfire management in the Biodiversity Areas is to prevent impacts from unplanned bushfire and to use fire to promote biodiversity.

Table 6: Bushfire Management Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
Operational Review to facilitate site access for offset management activities including installation, inspection and bushfire management.	Operational Review completed ² . Areas addressed within the review include road, fire trail and culvert construction along with maintenance activities, particularly track slashing (Sections 5.12 and 6.7).		
Fire excluded from the offset for initial 3 years.	Fire excluded from offset prior to 2015 (Section 6.9).		Fire excluded from offset prior to 2015.
Bushfire management activities through hazard reduction actions installation and maintenance of relevant access infrastructure.	Access tracks, fire trails, firebreaks, fencing and culverts have been completed as per Figure 9 and the Operational Review 2 (Sections 6.7 and 6.9). Fire management activities have been undertaken as required, including yearly access trail inspection, maintenance and repair of inaccessible tracks within one month of identification ² , hazard reduction burning (Sections 5.12, 6.7 and 6.9).	Fire management activities have been undertaken as required, including yearly access trail inspection, maintenance and repair of inaccessible tracks within one month of identification ² , hazard reduction burning (Sections 5.12, 6.7 and 6.9).	Regular bushfire management measures in place.
Monitoring and maintenance	Fuel loads monitored and documented (Sections 6.9 and 7.1). Identified issues incorporated into future management planning	Fuel loads monitored and documented (Sections 6.9 and 7.1). Identified issues incorporated into future management planning.	Fuel loads monitored and maintained. Risks identified and managed as part of part of hazard reduction actions.

Where possible, fire was excluded from the Biodiversity Offset area during the first three years (up to 2015) to assist with native regeneration. To assist with bushfire management, access tracks and firebreaks have been constructed and maintained as shown in the BMP Figure 9.

Hazard reduction burning has been undertaken in consultation with the RFS. Continued discussions have been held with the RFS to conduct fire management activities and any such activities will be assessed and implemented to ensure the most appropriate period for ecological burn activities whilst also giving due consideration to personnel and asset safety. Following the revegetation works, the aim is to exclude fire from the offsets areas for at least 5 years to allow for tubestock and seedlings to establish.

Monitoring of fuel loads to evaluate bushfire risk and guide bushfire hazard reduction activities is undertaken in conjunction with the annual vegetation monitoring. Further detail is included in Section 10 and Appendix F. Bushfire risk will continue to be mitigated through the maintenance of access tracks and fire breaks.

The DCM Offset Area was affected by an unplanned bushfire in November 2019 named the Buckley's Range Fire by the NSW RFS. A report has been prepared by Kleinfelder to document the bush fire event and the effect(s) on the Offset Area in compliance with the BMP monitoring and assessment requirements (Kleinfelder, 2020) (Appendix G).

An extracted summary of the survey results from the *Duralie Coal Buckley's Range Bushfire Impact Report 2020* is provided below (Appendix G).

Evidence of the effect of the fire on the conservation and ecological value of the Offsets Areas and any management actions to mitigate these were assessed as part of the survey.

Fire intensity varied during the Buckley's Range Fire due to several factors including topography, weather conditions over the duration of the fire (10 days total), differences in fuel load and vegetation type and backburning operations. The most intense areas of the fire were generally along the north-south ridgeline and adjacent slopes.

Fire interval is a key determinant of the ecological damage/change that fire imposes on vegetation communities. Comparison of the recommended fire intervals for the vegetation communities to the fire history of the Offsets Areas showed that with only eight years since the previous fire, the fire interval is just within the lower frequency for the drier woodland communities but too frequent for the wetter communities.

The overall ecological impact assessment of the fire anticipates that areas of low intensity burn will regenerate adequately, while the high intensity burn areas may have been adversely affected with a possible loss of biodiversity. Although it is too early to determine this, certainly the loss of litter, groundcover and the hypothesised loss of soil seed bank may at the very least slow recovery in these areas. The loss of larger trees in the wooded and the grassland areas may result in a longer-term impacts as they provide seed sources (especially in the grassland areas) and habitat for arboreal fauna.

Damage to infrastructure from the fires was fortunately limited. Fences were the main casualty with boundary fences destroyed, requiring repair and replacement to prevent unauthorised access. As a result of these fence losses, cattle have encroached into the Offsets Areas and will prove difficult to remove. Internal fences were extensively damaged and present a hazard to personnel and fauna and require removal.

Recommendations include future fire suppression in the offset area, fence removal and repair, clearing tracks, follow-up weeds control and ongoing monitoring.



Plate 6 –Photograph showing the intensity of the fire at the southern offset (15th November)



Plate 7 – looking upslope showing Blady Grass regrowth

9 REVEGETATION MANAGEMENT

9.1 Seed Collection and Propagation

Seed collection and propagation is undertaken in accordance with the BMP Section 5.7 and 6.10.

Table 7: Seed Collection and Tubestock Supply Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	CC
Collecting and propagating seed	Seed collection (of required species as specified in Section 6.10 and Appendix D) has commenced during vegetation clearance or an alternate seed source has been obtained. (Sections 5.7 and 6.10). Seed collection from cleared vegetation finalised (Section 5.7). Seed collection to obtain required quantities and species for future revegetation continued (Section 6.10, Appendix D).		Seed collection necessary to obtain required quantities and species for future revegetation completed.
Plant propagation/tubestock supply	Propagation of species required for revegetation work in Offsets commenced. Species and quantity as per guidelines in Section 5.7, 6.10 and Appendix D or adjusted based on additional literature/field trial results.	Propagation of species required for revegetation/supplementary infill planting work in Offsets undertaken as per guidelines in Sections 5.7 and 6.10 and Appendix D.	Plant propagation necessary to obtain quantities and species required for revegetation completed.

Revegetation in the BMP Revegetation Areas has occurred via seed and tubestock. Local endemic species are preferentially used where a seed supply is available, however consideration will be given to the use of a high quality seed sourced further from the site as required.

Where possible, seed required for revegetation activities has been collected from within the Biodiversity Offset area and surrounds. Specific tree and shrub species which have not been available for collection have been sourced through external third-party suppliers. Further seed collection may be undertaken if found necessary to meet the completion criteria of the BMP offset revegetation and mine site rehabilitation.

Kleinfelder along with several nurseries have been engaged to assist in the propagation of native plant species with tubestock grown under controlled nursery conditions and delivered to site as required for revegetation works.

9.2 Revegetation and Regeneration

Revegetation management is undertaken in accordance with the BMP Section 6.11 and 6.12. The aim of revegetation is to establish a range of habitat niches including native canopy, and understorey, with the goal of achieving self-sustaining vegetation communities as well as increasing the resilience to identified risks such as fire, herbivory and future weed invasion. The Revegetation VMUs in the Biodiversity Areas will be revegetated to substantially increase the area of native vegetation and maximise habitat diversity and a range of successional stages.

Table 8: Revegetation Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
Operational Review	Operational review including access, tracks and cultivation requirements for implementing revegetation completed (Section 6.7).		Operational Review completed and implemented.
Implementing Revegetation - Weed management and maintenance	Pre-cultivation spraying in all installation VMUs including control of exotic Sporobolus and fireweed undertaken (Sections 6.5 and 6.11). Pre-plant weed treatment in all installation VMUs as per Figure 7 undertaken as required (Sections 6.5 and 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11. Maintenance including watering and herbivory controls, undertaken as required (Section 6.11).	Pre-plant weed treatment in all installation VMUs as per Figure 7 undertaken as required (Sections 6.5 and 6.11). Control of competitive plants within revegetation areas as detailed in Section 6.11. Maintenance including watering and herbivory controls, undertaken as required (Section 6.11).	Pre-planting weed control undertaken, including control of threatening weeds Sporobolus and Fireweed. Competitive plants controlled during revegetation establishment.
Implementing revegetation	Initial cultivation of all proposed trial installation VMUs commenced (Vegetation Management Units I, S, U and AB.) according to guidelines in Section 6.11. Trial revegetation for VMUs I, S, U and AB completed. Plant palettes adjusted where field trials or research demonstrate alternative species/density (Section 6.10). Propagation of species required for revegetation work in Offsets commenced. Species and quantity as per guidelines in Sections 5.7 and 6.10 and Appendix D.	Revegetation planting finalised. All plants prescribed in Appendix D have been installed. (Section 6.11). Based on learnings from the revegetation trials, planting of tubestock/direct seeding in installation VMUs according to species palette and quantity guidelines in Appendix D and Section 6.1 has been completed	Species type and quantities planted according to threshold guidelines in the species palette or as guided by on site trials. 90% survival of canopy and shrub-layer plants 12 months after installation, including replacement of lost plants to above threshold levels. Revegetation areas have met Assessment Criteria and Completion criteria described in Table 24, Section 8 (e.g. 90% of all initial canopy species rates are present within VMUs).
Monitoring and reporting	Monitoring and reporting of trial revegetation results, changes to plant palette, plant health, establishment success and maintenance activities. (Section 7.1).	Monitoring and reporting of trial revegetation results, changes to plant palette, plant health, establishment success and maintenance activities. (Section 7.1).	Annual Monitoring and reporting completed.

Revegetation Preparation & Trials

Pre-cultivation weed spraying was undertaken in Summer to Autumn 2016 in preparation for the trial revegetation works. Initial revegetation works for VMUs I, S and U commenced in Autumn of 2016. Preparation works were completed including seed collection, inoculation, growing of tube-stock and ground preparations including weed spraying. The trial revegetation program included methods involving both tube-stocking, and direct seeding. Ground preparation was site specific and included weed spraying, crash grazing and back burning as required.

Revegetation works in VMUs AF, AE, AA and Z were undertaken during **December 2016** and included ground preparation and direct seeding of approximately 80 hectares. Due to the inability to undertake controlled burning, slashing was undertaken as an alternative option prior to direct and broadcast seeding.



Plate 8 - Loading seed for revegetation works.



Plate 9 - Spreading native tree and shrub seed.

Revegetation Implementation

Tubestock was propagated during Summer 2016/2017 in preparation for Autumn planting in 2017. VMUs Y, AD and S, (approximately 40 hectares), located on alluvial flats near Mammy Johnsons River were prepared for planting by slashing, spraying for weeds and ripping. This was followed by the planting of approximately 7,200 tube-stock in **April 2017**. The results of the 2017 re-vegetation activities are reported in the *DCM Biodiversity Offsets Revegetation Program Report Spring 2016 - Autumn 2017*.

Following the hazard reduction burning in **August 2017**, revegetation works in VMUs Z, AB and AC were undertaken. In **September 2017**, direct seeding of approximately 52 hectares was completed, followed by harrowing.



Plate 10: Tube-stock being prepared for the biodiversity offset.



Plate 11: Planted tube-stock.

Tube-stock planting of VMUs F, V, W and X was proposed for Autumn 2018 including approximately 16,000 plants over 61 hectares. The native tree seed was propagated over the Summer of 2017/2018 by Cumberland Plain Seeds. However, due to the slower than expected establishment of the tubestock, planting was postponed during winter and completed in **September 2018**. The results of the 2018 re-vegetation activities are reported in the *DCM Biodiversity Offsets Results of Spring 2018 Planting Report*.



Plate 12: *Tubestock planted in September 2018.*



Plate 13: *Tubestock planted in September 2018.*

During Spring 2019 tubestock was propagated in preparation for further revegetation works in Autumn 2020 to reach the required woodland density and species diversity in VMUs F, V, W, X, AA and AH. Plans showing the area proposed for revegetation in the Biodiversity Areas in 2020 are included in Appendix E. The results of the 2020 re-vegetation activities are reported in the *DCM Biodiversity Offsets Planting Program Report Autumn 2020*.

The Duralie Offsets planting involved in-fill planting and new planting areas totaling 55.8ha in three vegetation communities. VMUs F and W were planted with species characteristic of the Rough-barked Apple – Red Gum grassy woodland on floodplain (Cabbage Gum variant). A total of 2,370 tubestock were installed into VMU F and W. VMU AH was planted with species characteristic of the Forest Red Gum – Grey Ironbark – Thick-leaved Mahogany Forest community. In total 5,810 tubestock were installed into this VMU AH. Species characteristic of the Spotted Gum – Grey Ironbark Forest (Spotted Gum Variant) were installed into a total of 18.3ha in VMUs – VMU AA, VMU V and VMU X). In total 6,621 tubestock were installed in these areas. Overall, this year's planting program was deemed to be very successful. Survival is expected to be very good with excellent rainfall experienced before and during planting.



Plate 14: *Tubestock planting in VMU V in Mar 2020.*



Plate 15: *Tubestock preparation in 2020.*

A revegetation program for 2021 is being prepared to continue to progress towards the biodiversity offset completion criteria.

Monitoring

Following the initial re-vegetation works in 2015, annual vegetation monitoring (including LFA and vegetation dynamics) was undertaken in **January 2017** and continues to be undertaken annually. The results from the biodiversity offset monitoring are shown in Section 10. Results from the annual monitoring will be used to measure revegetation against the performance criteria and completion criteria and to determine future works requirements and maintenance activities.

10 BIODIVERSITY OFFSET MONITORING AND REPORTING

The Biodiversity Offset monitoring and reporting program is prescribed in the BMP Section 7. The program aims to monitor and report on the effectiveness of the BMP management measures and progress against the detailed performance and completion criteria.

Table 9: Monitoring and Reporting Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	CC
Monitoring and reporting	Monitoring and reporting has been undertaken ³ as per requirements in Sections 7.1 and 7.2. Independent Environmental Audit has been supplied to the NSW Secretary of the DP&E for review.	Monitoring and reporting has been undertaken ³ as per requirements in Sections 7.1 and 7.2.	Monitoring requirements completed when all completion criteria are achieved in accordance with Section 8 (e.g. 357.5 ha of revegetated woodland/open woodland habitat areas and 36 ha of revegetated forest habitat areas are a self-sustaining ecosystem).

As described in the Section 7 of the BMP an annual report reviewing DCPL's environmental performance and progress against the requirements of the BMP including monitoring and reporting is prepared annually and appended to the *Duralie Coal Mine Annual Review*. The Annual Biodiversity Report, reports on monitoring for:

- Effectiveness of revegetation in the offset area;
- Usage of the offset areas by fauna;
- Effectiveness of weed control;
- Effectiveness of feral animal control;
- Nest box monitoring program.

10.1 Habitat and Vegetation Condition Monitoring

Habitat and vegetation condition monitoring is undertaken to quantitatively measure the change in habitat and vegetation condition over time. The visual monitoring and photo monitoring programs are undertaken concurrently with the vegetation monitoring to provide additional information on the change of the Biodiversity Offset Areas over time and inform maintenance requirements.

To monitor the effectiveness of revegetation in the Biodiversity Offset Areas, Greening Australia was commissioned to undertake the baseline monitoring of LFA and vegetation structure within the Biodiversity Offset areas in **February 2013**. The baseline monitoring provides information to track the progression towards meeting the completion criteria of the BMP.

The annual vegetation and landscape function monitoring continues to be undertaken and was repeated in **February 2019**. The results are provided in the *DCM Biodiversity Offset Monitoring Report 2020* (Appendix F). An extracted summary is reproduced below. The next round of monitoring is scheduled for 2021.

In accordance with Section 7 of the Duralie Coal Mine – Biodiversity Management Plan (2018), monitoring and assessment of the effectiveness of the Offset Area revegetation is required. This assessment will be conducted using the stipulated methodologies (Section 7.1 of the BMP) which includes both components of Ecosystem Functional Analysis (EFA), Landscape Functional Analysis (LFA) and Vegetation Dynamics to measure the progression of the

rehabilitation towards a self-sustaining ecosystem, floristic surveys and walkover surveys to assess the effectiveness of the revegetation efforts and weed control.

This report presents the results of the monitoring undertaken in February 2020. A subset of Vegetation Management Unit (VMU) transects were selected, which were established in the 2013 baseline survey. A total of 15 VMUs were monitored in the Offset Areas – 14 Installation VMUs (where active planting and seeding is required) and one regrowth management VMU (weed and erosion control only)(Table 1). These 14 VMUs had been the subject of active management where biomass reduction through slashing, grazing or ecological burns followed by planting and/or seeding had occurred, whereas the remaining VMU has been the subject of weed control works.

A significant bushfire event affected the Duralie Biodiversity Offset area during November 2019. The Buckley's Range Bushfire in November 2019 divides the survey result into eight fire affected VMUs (all were located east of Johnson's Creek Rd) six of which were installation VMUs and VMU P (regrowth management). The remaining seven VMUs were not affected by the fire.

LFA results for the fire affected VMUs show that for all but two of the VMUs, indices were lower than the previous survey in 2019 and in most cases were below the 2013 and 2014 survey results. The exceptions were VMUs AB and Z which had been subjected to ecological burns instigated by Duralie Coal and supervised by the Rural Fire Service (RFS) in 2017. The major effect of the bushfire was attributed to the loss of litter, which is a key component of all indices. Of the non-fire affected VMUs, all but one recorded increase in the LFA indices with all indices at or above the previous survey results. VMU W was an exception with decreases in all indices attributed to transect location with the combined effects of vehicular traffic and cattle incursion serving to increase compaction and decrease litter build up.

The previous survey resulted in vegetation dynamics being surveyed on nine of the VMUs. This year vegetation dynamics could only be conducted on seven VMUs (six installation VMUs plus VMU P). Cattle incursion on VMU F had resulted in loss of planted tubestock, while VMU I had suffered loss of woody vegetation due to the fire. Vegetation structure in the installation VMUs shows further planting is required with results showing that the while canopy species have survived, there were few planted midstorey and almost no shrub species recorded. Only VMU U has nearly achieved the required canopy density (80 stems per hectare), achieving a calculated 75 stems per hectare. The remaining installation VMUs where tubestock planting had been undertaken recorded between 34 stems/ha (VMU Y) and a low of 6 stems/ha (VMU AD). It is suggested that these numbers are below actual numbers given that during walkover surveys smaller individuals were often observed to be below the prevalent exotic shrubby vegetation and with further time, will be able to located and measured during the surveys. VMU P recorded a small decrease in stem density with a loss of some shrubs due to the fire, although this is seen as a temporary result.

Installation VMUs where slashing and seeding had been the method of revegetation were also the main fire affected VMUs. In these VMUs, the fire provided mixed results. Remnant vegetation was adversely affected in places with some paddock trees lost and many saplings and shrubs destroyed, especially in the southern sections of the offset areas where the fire was most intense e.g. VMU AF. However, in other areas of the offset areas the fire has stimulated the germination of seedlings e.g. VMU AE, Z and I. Natural regeneration was recorded in those VMUs where remnant vegetation remains as isolated stands (e.g. VMU U), in gullies (e.g. VMU AB) or is located adjacent to the VMU (e.g. VMU Y).

Woody weeds were observed and recorded throughout the offset area. Non-fire affected VMUs recorded large brambles of blackberry, and in the alluvial flat VMUs (VMU AD, F, S and Y), privet and wild tobacco were also observed. In the fire affected VMUs, blackberry was observed to be re-growing from rootstock, while the dense lantana thickets that were encountered in previous surveys were burned away and were not observed to be re-growing. However, blackberry, lantana and wild tobacco were still common in the gullies.

Other observations were limited to damage to internal fencing in the fire affected VMUs, either directly by the fire itself or through fallen trees. Erosion was limited to some notching in the ephemeral gully lines considered to be natural features that will stabilise, with a potentially more serious observation of tunnelling in VMU U.

Recommendations made included:

- In-fill planting to increase biodiversity, designed to complement the survival in that VMU – e.g. more shrubs in VMU U and more canopy in VMU Z.*
- But where the VMU requires biomass reduction to enable this to occur e.g. VMUs AD, S and Y, allow another season or two for smaller canopy to grow above the surrounding woody exotic vegetation.*
- Cool season ecological burns in the non-fire affected VMUs around the remnant vegetation patches to stimulate the germination of native species' seeds in the soil seed bank and facilitate outward colonisation. Manual control of biomass around existing shrubs and saplings may be require facilitating their survival.*
- Targeted weed control in the remnant patches to prevent damage to the re-establishing native vegetation, with more widespread control works elsewhere.*
- Relocation of the transect in VMU U, W and Y to locations more representative of the revegetation effort.*

10.2 Fauna Monitoring

Monitoring of fauna usage within the Biodiversity Areas is conducted every three years to document the fauna species response to improvement in vegetation and habitat in the Biodiversity Areas and assess the performance in providing habitat for a range of vertebrate fauna. The surveys include an assessment of habitat complexity, species richness and abundance.

AMBS was engaged to undertake fauna monitoring within the Biodiversity Offset areas and native mine rehabilitation areas during February 2018. The results are provided in the *DCM Fauna Surveys of the Offset and Mine Rehabilitation Areas, February 2018* (Appendix H). An extracted summary is provided below.

"Targeted fauna surveys were undertaken at five sites within the Duralie Offset Area and two sites in the Duralie Mine Rehabilitation Area during February 2018. At most sites survey techniques included pitfall traps, funnel traps, Elliott A traps, harp traps, ultrasonic call recording, spotlighting, diurnal bird surveys and reptile searches. Opportunistic observations of signs of fauna were noted throughout the field survey period, including during transit between surveys sites".

*"A total of 124 species of vertebrate were recorded, comprising 8 frogs, 10 reptiles, 56 birds and 30 mammals..., most of which were native. With the exception of reptiles, a similar number of frog, mammal and bird species were recorded at Mine Rehabilitation Area sites compared with Offset Area sites. Five introduced species were recorded during the surveys, including Cattle (*Bos taurus*), House Mouse (*Mus musculus*), European Rabbit (*Oryctolagus cuniculus*), Black Rat (*Rattus rattus*) and Red Fox (*Vulpes vulpes*). Fifteen of the species detected are listed as threatened or migratory on the schedules of the Biodiversity Conservation Act 2016 (NSW) and/or the Environment Protection Biodiversity Conservation Act 1999 (Cth).*



Plate 16: Koala (*Phascolarctos cinereus*)



Plate 17: Long-nosed Potoroo (*Potorous tridactylus*)

11 MAMMY JOHNSONS RIVER STABILISATION

In accordance with Section 6.8 of the BMP a detailed design for the in-stream rehabilitation of a severely eroded section of Mammy Johnsons River (MJR) has been prepared by Alluvium (2013) (Appendix I). No works on the MJR bank stabilisation have commenced during the reporting period. Further planning is required.

Table 10: MJR Bank Stabilisation Performance Criteria (PC) and Completion Criteria (CC)

Management Action	Completed Activities to June 2018	Annually from June 2018 onwards PC Maintenance Phase	Completion Criteria
River bank stabilisation design	Design for the in-stream rehabilitation of a severely eroded section of Mammy Johnsons River has been prepared. Office of Water engaged regarding plan approval ¹ (Section 6.8).		Design of stabilisation plan completed and approved by the Office of Water
River bank in-stream rehabilitation		In-stream rehabilitation works undertaken ¹ (Section 6.8).	Rehabilitation of severely eroded section of Mammy Johnsons River completed.

12 LONG TERM SECURITY AND CONSERVATION BOND

12.1 Long Term Security

In accordance with Condition 42, Schedule 3 of Project Approval 08_0203, DCPL is required to make suitable arrangements for the long-term security of the Duralie Extension Project Biodiversity Offset Area. DCPL used the mechanisms available under section 88E(3) of the NSW Conveyancing Act, 1919, namely:

- Registration of a Positive Covenant under section 88E(3) of the NSW Conveyancing Act, 1919; and
- Registration of a Restriction on the Use of Land by a Prescribed Authority under section 88E(3) of the NSW Conveyancing Act, 1919.

Public Positive Covenants and Restrictions on the Use of Land for the Biodiversity Offsets have been registered on title with NSW Land and Property Information (LPI) in **May 2015**.

12.2 Conservation Bond

In accordance with Condition 44, Schedule 3 of Project Approval 08_0203, DCPL is required to lodge a Conservation Bond with the DP&E which covers the cost of implementing the Biodiversity Offset Strategy detailed in the BMP.

The conservation bond for the Biodiversity Offset areas was calculated by Greening Australia and verified by Rider Levett Bucknell in December 2013. The terms of the conservation bond in the form of a Bank Guarantee were approved by NSW Department of Planning & Environment (DP&E) on **12 December 2013**. The Bank Guarantee has been subsequently provided to DP&E.

In December 2017, an Independent Environmental Audit of the DCM was undertaken in accordance with PA 08_0203. A revision of the BMP was approved in January 2019 in accordance with PA 08_0203 Schedule 5 Condition 4. Following this, a revision of the conservation bond will be prepared and lodged with DP&E in accordance with Schedule 3 Condition 45. The revised conservation bond will be lodged in the next reporting period.

13 COMMONWEALTH EPBC APPROVAL COMPLIANCE REPORTS

In accordance with the Commonwealth Approval [EPBC 2010/5396], during the reporting period DCPL submitted to the Department of Environment and Energy (DoEE) the following compliance report:

- *Duralie Coal Extension Project Annual Compliance Report 2020*, submitted on **16 April 2020** (Condition 20).

Additionally, the following reports were submitted annually for the first five years following the commencement of the operation:

- *DCM Implementation of the Giant Barred Frog Management Plan Annual Reports (Condition 10);*
- *DCM Implementation of the Biodiversity Management Plan Annual Reports (Condition 14(i)).*

These reports are now required to be submitted every **fifth** (5) year before the anniversary of the commencement of the operations.

14 APPENDICES

Appendix A: DP&E approval of the BMP.

Appendix B: DCM Annual Review 2020 – Figure 4 Mining & Rehabilitation Areas

Appendix C: AMBS Ecology & Heritage - Nest Box Programme for the Duralie Offset Area, Annual Report for 2019.

Appendix D: AMBS Ecology & Heritage - Invasive Animal Study, Duralie Coal Mining Lease and Offset areas, 2017.

Appendix E: Biodiversity Offset Area – Areas proposed for revegetation in 2020.

Appendix F: Kleinfelder - Duralie Coal Mine Biodiversity Offsets Monitoring Report 2020.

Appendix G: Kleinfelder – Duralie Coal Buckley’s Range Bushfire Impact Report 2020.

Appendix H: AMBS Ecology & Heritage - DCM Fauna Surveys of the Offset and Mine Rehabilitation Areas, 2018.

Appendix I: Alluvium - Mammy Johnson’s River – Bank Stabilisation Detailed Design, 2013.

(Appendices available on request)