Alkane Resources Ltd, Tomingley Gold Operations

Fauna Monitoring Report

Dubbo Regional LGA NSW

December 2019

IMAGE: Grey-crowned Babbler at TGO

AREA Environmental Consultants & Communication

6 Belmore Street Dubbo NSW 2830

72 Brisbane Street Dubbo NSW 2830

Ph 0409 852 098

phil@areaenvironmental.com.au

ABN:29 616 529 867
Advanced Regional Environmental Assessments (AREA)

- ✓ Environmental impact assessment and approvals
- ✓ High level preliminary environmental assessment (PEA)
- ✓ Review of environmental factors (REF)
- ✓ Peer review
- ✓ Community engagement
- ✓ Biobanking and biodiversity offsetting assessments
- ✓ Aboriginal heritage assessments and community walkovers
- ✓ Landscape design

AREA Environmental Consultants & Communication acknowledge Traditional Owners of the country on which we work

Executive Summary

Tomingley Gold Operations (TGO) (the client) of Alkane Resources Ltd engaged AREA to undertake annual fauna monitoring at the Tomingley Gold Mine and its associated biodiversity offset areas, as per the Tomingley Gold Operations Biodiversity Management Plan (BMP).

TGO was assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Project Approval (PA 09_0155) being granted by the NSW Department of Planning and Infrastructure (now DP&E) in 2012. Approval has been modified three times subsequently.

TGO has 127Ha of biodiversity offset areas (BOA) in place, with these areas secured under a Property Vegetation Management Plan (PVP). Amelioration planting has been carried out to improve biodiversity across these areas where the previous use was cropping and grazing. Ecological assessments and biodiversity monitoring have been undertaken at the project site and BOA in 2011 and 2016. A bat survey was also undertaken in 2014. Field assessment for this year's monitoring occurred on 16 to 19 December 2019.

The 2019 monitoring event aimed to address the following criteria as outlined in the Tomingley BMP:

1. Grey-crowned Babbler population census
2. Bat monitoring
3. Fat-tailed Dunnart monitoring
4. Cyanide impacts on native fauna
5. Amphibian survey

Thirty-eight fauna species were recorded. Grey-crowned Babblers were observed to be present in two of three of their previously known locations. Personal communication with Mr Phillip Cameron, who conducted the initial ecological assessment, indicates the population of Grey-crowned Babblers in these locations has reduced since the EIS assessment for this project. The population is likely to have been impacted by the severe drought in NSW during 2017 to 2019.

Bat monitoring detected nine species, one of which, Southern Myotis *Myotis Macropus*, a fishing bat, is a *Biodiversity Conservation Act 2016* Vulnerable species which has not been previously detected in the area.

Fat-tailed Dunnart was not recorded in the area. A European Red Fox *Vulpes Vulpes* was sighted in an active den within the mine site which would impact the native fauna species. The close proximity of the den to TGO operations and an indicated lack of desirable diet available in the current conditions suggest it would be an ideal time to attempt to trap and eliminate European Fox from the site.

Cyanide does not appear to be significantly affecting fauna. Recommendations have been made to revise the fauna observation processes around the Residue Storage Facility and include the revision in an update to the BMP.

Four amphibian species were detected in healthy population levels, despite a lack of water in Gundong Creek and other aquatic areas. One of these species Broad Palmed Rocket Frog *Litoria latopalmata*, has not previously been recorded in fauna surveys at TGO.

Overall, fauna observations were lower than previously reported, however this decrease is not considered significant. 2010 received much greater survey effort for initial mine approvals. Also, both previous reporting periods, 2011 and 2016 are known to have had prime conditions during the surveys preceded by higher than average rainfall, whereas the 2019 survey followed three years of below average rainfall and occurred during a severe drought.

This was not a full biodiversity assessment. However, despite lower fauna recordings than previous, survey indicated there is still moderate diversity in the fauna within the mine site which is on par with previous assessments. The trend is likely linked to rainfall rather than disturbance. The result reflects the environments capacity to provide resources depending on rainfall. Fauna numbers should increase as the quality of habitat improves and rainfall becomes more abundant and regular.

Recommendations have been made to maximise the effectiveness of future monitoring events.

Document Controls

Proponent	Tomingley Gold Operations (Alkane Resources)		
Client	Tomingley Gold Operations (Alkane Resources)		
Project No / Purchase Order No	PO322832		
Document Description	Fauna Monitoring Report 2019		
Clients Representative Managing this Document	**AREA Person(s) Managing this Document**		
David Pritchard	Genevieve Peel		
AREA Job Number	Q0237		
Document Status: FINAL	Version	Date	Action
Series V1.X = internal edits	V1.0 V1.1	19/03/2020 20/03/2020	GP to AW Internal review (AW)
Series V2.X = Client internal edits	V2.0 V2.1	23/03/2020 31/03/2020	AREA to Client Client to AREA
FINAL when draft is approved by client	V3.0	01/04/2020	Final to client
Prepared For	**Prepared By**		
Ken Bermingham Tomingley Gold Operations Alkane Resources Office: (02) 68 67 9780	Genevieve Peel Environment Consultant AREA Environmental Consultants & Communication Pty Ltd 72 Brisbane Street Dubbo NSW 2830 Dubbo NSW 2830 M 0429 452 221 E gen@areaenvironmental.com.au ABN:29 616 529 867		

Table of Contents

FIGURES

TABLES

Terms and acronyms used in this document

Acronym	Definition
BC Act	Biodiversity Conservation Act 2016
BOA	Biodiversity Offset Area
BOM	Bureau of Meteorology
BOS	Biodiversity Offset Area
BMP	Biodiversity Management Plan
BOS	Biodiversity Offset Strategy
DPIE	NSW Government of Planning, Industry & Environment (Formally OEH)
EEC	Endangered Ecological Community
EPA	NSW Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
LGA	Local Government Area
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Types
VIS	Vegetation Information System

1 Introduction

1.1 Locality

Tomingley Gold Operations (TGO), a wholly owned subsidiary gold mine and processing plant of Alkane Resources, is located approximately 50 kilometres south-west of Dubbo in Central West NSW in the Narromine Local Government Area (LGA) on the outskirts of the small town of Tomingley (Figure 1-1 and Figure 1-2).

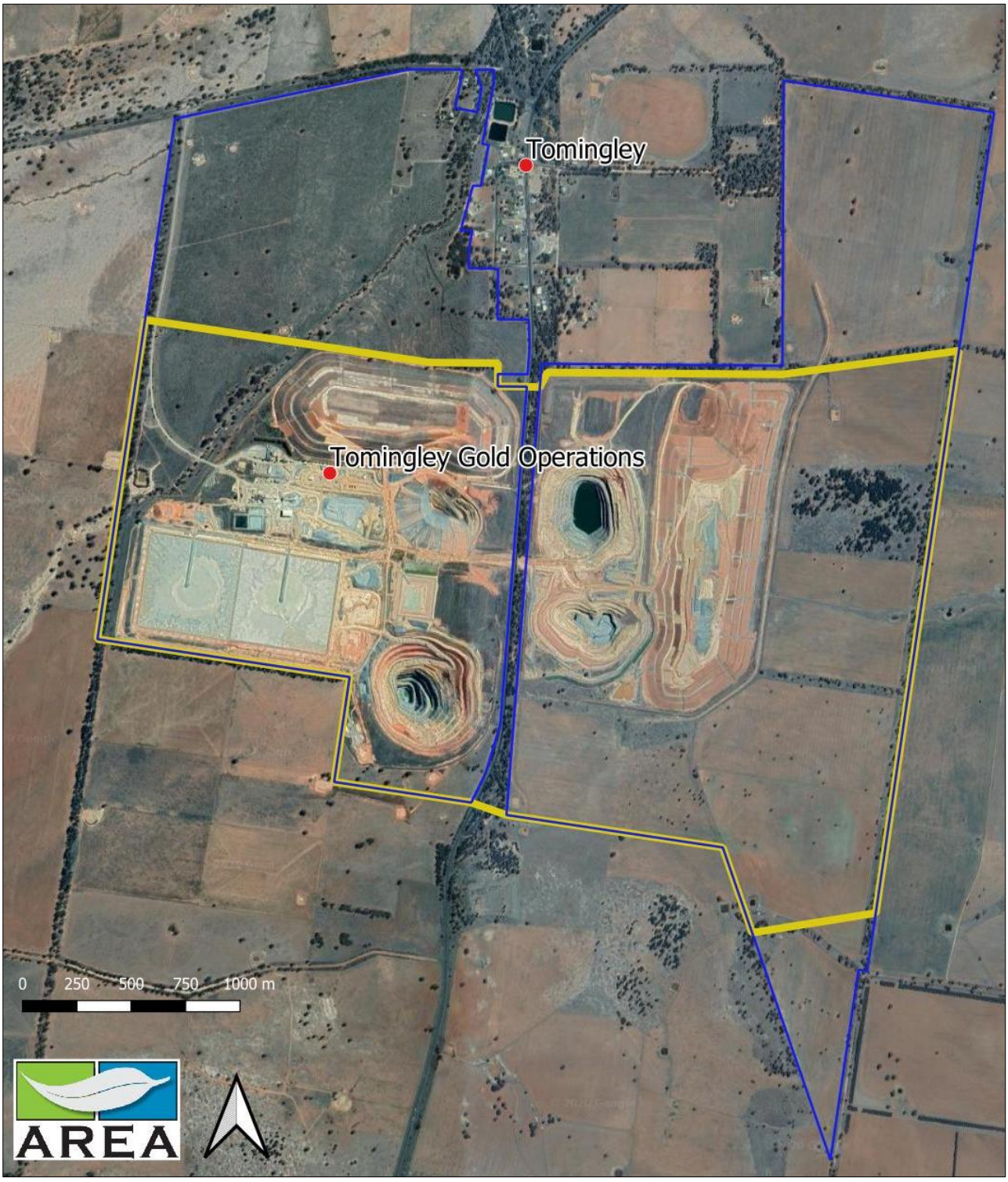
Regional context of the study area is provided in Table 1-1.

Table 1-1: Regional context of the Biodiversity Offset Area

Criteria	Site context
Interim Biogeographic Regionalisation for Australia (IBRA Region)	Darling Riverine Plains Region, Bogan-Macquarie Sub-region
State	New South Wales
Topographical map sheet	Peak Hill 8532N
Local Government Area	Narromine
Nearest town / locality	Tomingley (1.5 kilometres) Peak Hill (18 kilometres)
Accessed from nearest town by	Tomingley via Tomingley West Road
Land use / disturbance	Agriculture (ploughed landscapes), continuous grazing, urban (Tomingley), road reserves, Biodiversity Offset Area and mining activities.
Nearest waterway	Gundong Creek traverses the north-western section of the Mine, while a number of unnamed drainage lines occur within and immediately north and east of the Mine. All ultimately drain into the Bogan River, approximately 10 kilometres south west of TGO.
Spot point Australian Height Datum (AHD)	Approximately 260m to 280m

Figure 1-1: Location of Tomingley Gold Operations

Figure 1-2: Tomingley Gold Operations Aerial view



1.2 Background

AREA Environmental Consultants & Communication (AREA) was commissioned by Tomingley Gold Operations to undertake fauna monitoring, as a requirement of the 'Tomingley Gold Operations Biodiversity Management Plan' (BMP) (Revision 7 December 2018).

Tomingley Gold Operations was assessed under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act), with Project Approval (PA 09_0155) being granted by the NSW Department of Planning and Infrastructure (now DPIE) in 2012. Approval has been modified three times subsequently. Mining operations commenced at Tomingley in January 2014.

Annual Biodiversity Review at TGO is managed under the Biodiversity Management Plan (BMP), completed in accordance with Schedule 3, Condition 37 of PA 09_0155. The BMP details the actions implemented at TGO to mitigate impacts on native fauna and vegetation from mining related activities such as storage of potentially hazardous process residue and the clearing of native vegetation.

Along with mitigation of mining impacts, the major biodiversity enhancement measure at TGO is the establishment, management and long-term protection of biodiversity offset areas in accordance with Schedule 3, Conditions 33 and 34 of PA 09_0155. To facilitate long-term security for the offset areas, a Property Vegetation Plan (PVP) was agreed to by TGO and approved by Local Land Services NSW in April 2015. The BMP incorporates measures and activities to manage and enhance TGO biodiversity offset areas (Figure 1-3), as required by the PVP.

Biodiversity management at TGO consists of the following two main components:

- Management of vegetation communities within the designated Biodiversity Offset Area (BOA)
- Ongoing management and monitoring of flora and fauna within the mine site.

Ecology Assessment was first undertaken September 2011 prior to the mine operations commencing in 2014 and covered a much larger project site. Field survey for the biannual fauna monitoring program is completed every two years and was completed in December 2016 by OzArk Environmental & Heritage Management Pty Ltd. A bat survey was also undertaken in October 2014.

The 2011 fauna survey revealed the broader project site supported a moderate diversity of native fauna with a total of 134 vertebrate fauna species (123 native and 11 introduced) recorded.

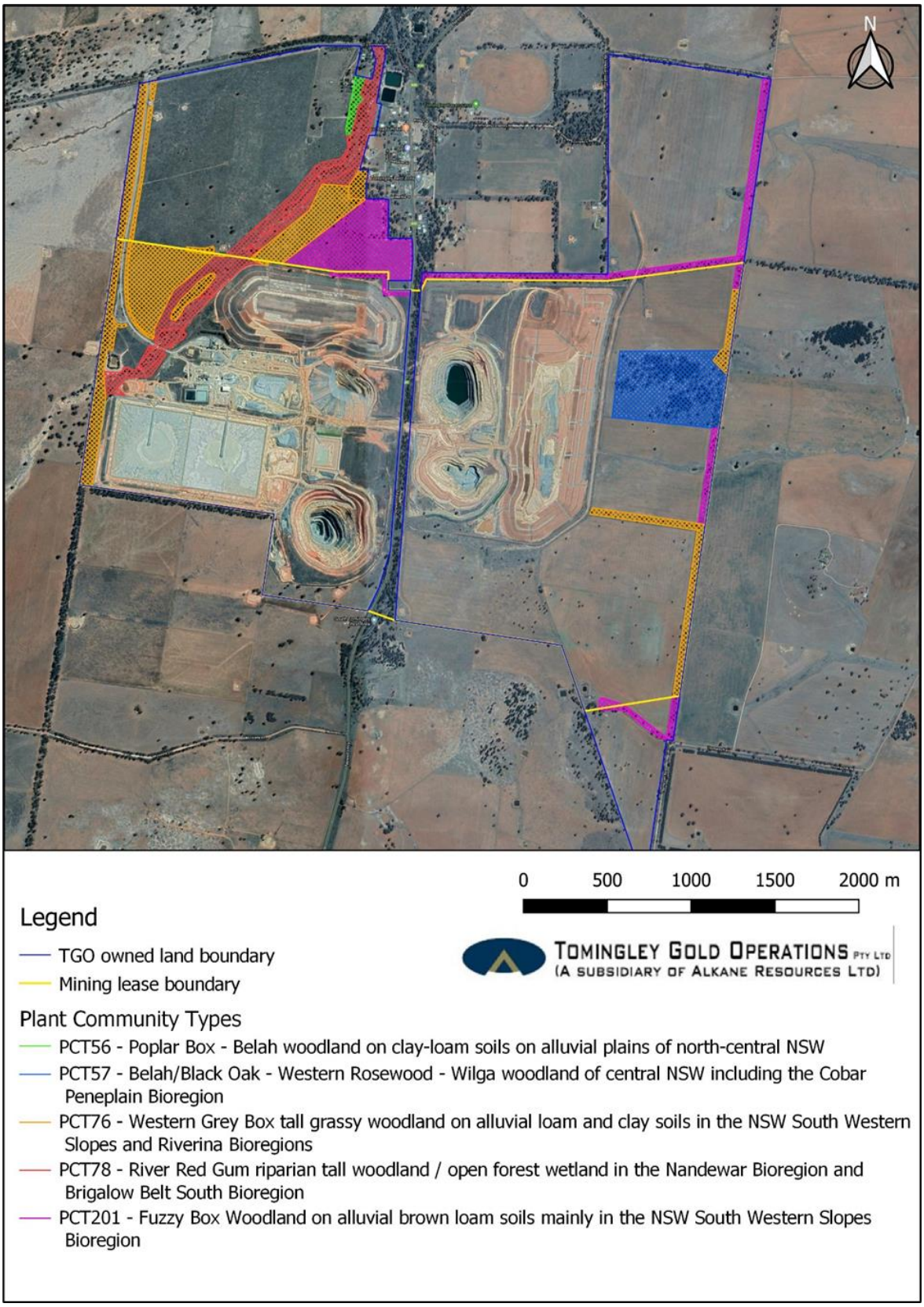
During the 2016 field survey, 41 fauna species were recorded. Of these, two were invertebrate pest species found in low densities. Of the 41 fauna species, four vulnerable species listed under the TSC Act were recorded:

- Grey Crowned Babblers (*Pomatostomus temporalis temporalis*)
- Little Pied Bat (*Chalinolobus picatus*)
- Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*)
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*).

At this time the known Grey-Crowned Babbler population at TGO was observed in the biodiversity offset area of TGO property. Recommendations were made in regard to future monitoring programs and vegetation management which could improve fauna monitoring results.

This report addresses TGO's obligatory fauna monitoring, as outlined by the BMP. Vegetation monitoring is not addressed in this report.

Figure 1-3: TGO Biodiversity Offset Areas Plant Community Types



2 Methods

Field survey was undertaken on 16-19 December 2019 by two AREA ecologists.

2.1 Project personnel

This monitoring and preparation of this monitoring report was carried out by appropriately qualified and experienced staff (Table 2-1).

Table 2-1: Summary of AREA project teams' qualifications

Name	Position	CV Details	Role in this project
Addy Watson	Principal Environment and Community Consultant	• Grad. Dip. Captive Vertebrate Management, Charles Sturt University • Grad. Cert. Social Impact, University of NSW • B. Env. Sc. University of New England. • Diploma Project Management • NSW Biodiversity Assessment Method Accredited Assessor (Number BAAS19066) • Lean Six Sigma Certificate (Sydney Uni) • WHS White Card • Apply First Aid. Certificate number: 07328	Project Management Fieldwork Report Editing - QMS
Genevieve Peel	Environmental Consultant	• Bachelor of Science, Environmental (Hons) UNSW • Cert III Captive Animal Management • Cert IV Veterinary Nursing	Fieldwork Report Writing

2.2 Objectives and monitoring targets

Table 2-2 presents the objectives and targets as outlined in the Tomingley Gold Operations Biodiversity Management Plan. The objectives highlighted are the ones relevant to this report.

Table 2-2: TGO biodiversity management objectives and targets.

Objectives	Target	Timeframe
Protection of Grey-crowned Babblers (eastern sub-species) and their habitat	• Schedule any clearing outside breeding period (spring). • Retain fallen timber and leaf litter from under remnant vegetation. Nesting continues successfully.	Monitor nest construction and use annually
Monitor Grey-crowned Babbler population.	• Implement monitoring annually. Resident population remains.	Two yearly monitoring
Monitor frog population.	• Implement monitoring annually. Maintain frog habitat within the Biodiversity Offset Area.	
Monitor Fat-tailed Dunnart population.	Implement and report monitoring annually.	
Monitor microbat population.	• Implement and report monitoring annually. Populations of microbats are not reduced.	

Objectives	Target	Timeframe
Monitor and control vertebrate pest populations.	• Monitor annually and present results. • Develop pest control procedure. Implement pest control program in consultation with adjoining load owners.	Annual monitoring
Monitor and control weed populations.	• Implement spraying program bi-annually as required to reduce or remove weed populations. Target weeds listed on noxious species lists.	Monitor bi-annually.
Minimise impact on local wildlife such as tree dependent species including nesting fauna.	• Engage ecologist during tree clearing operations. Relocate to elsewhere on site any wildlife in processing area.	Ongoing
Increase or maintain habitat value at the time of mine closure.	• Implement habitat enhancement and extension directives stated within PVP document. Implement targeted fauna monitoring as explained above in this table.	Biodiversity Offset Area secured early 2015 Biodiversity and fauna monitoring occurs annually.
Protect and enhance areas of Endangered Ecological Communities (EEC) in line with PVP.	• Enhance remnant and enhanced vegetation to meet biometric vegetation benchmark criteria. • Engage consultant to undertake Landscape Function Analysis annually. Increase health of groundcover, community complexity and species diversity to achieve Biometric benchmarks.	Commenced in October 2014. Will continue to mine closure and mining lease relinquishment.
Minimise or prevent cyanide related fauna deaths.	• Samples of maximum WAD cyanide concentration released to the Residue Storage Facility (RSF) is less than 30mg/L and the 90th percentile limit is less than 20mg/L. Zero animal deaths from exposure to RSF.	Ongoing

The BMP outlines Site Specific Procedures which have been developed for TGO fauna monitoring activities:

Relevant ecological information captured during vegetation monitoring indicates habitat usage and potential fauna population trends. Fauna monitoring surveys occur in spring or summer every two years and include the following activities:

1. *Grey-crowned Babbler monitoring as a means of population census and to identify breeding locations as a gauge breeding success.*
2. *Bat monitoring (over three consecutive nights per event) to establish population trends. Specialist recording equipment and expert data analysis is required to enable accurate species identification.*

3. *Fat-tailed Dunnart monitoring as a means of population census and to gather relevant species management information.*
4. *Cyanide impacts on native fauna as described in Section 8.1.*

These procedures have been the guideline of AREA's fauna monitoring. Additionally, a targeted amphibian survey has been included following recommendation from 2016 monitoring and to meet the BMP objective:

Monitor frog population.	• Implement monitoring annually. • Maintain frog habitat within the Biodiversity Offset Area.

1.1 Fauna survey and habitat assessment

Methods used to monitor fauna populations within the mine site (including the BOA's) are outlined in the following sections.

1.1.1 Birds

Bird monitoring for this survey aimed to address the BMP outlined Site Specific Procedure:

1. Grey-crowned Babbler monitoring as a means of population census and to identify breeding locations as a gauge breeding success.

Grey-crowned Babbler (GCB) populations were surveyed using a rolling bird survey, stopping and listening throughout the mine site, in vehicle and on foot in areas GCB's are known to occur. During the stops, birds seen or heard are recorded. The survey also accounted for presence/absence, locating nests and breeding success, recording family size, composition and behaviour where possible. Opportunistic sightings of other bird species were also recorded.

1.1.2 Bats

Bat monitoring for this survey aimed to address the BMP outlined Site Specific Procedure:

2. Bat monitoring (over three consecutive nights per event) to establish population trends. Specialist recording equipment and expert data analysis is required to enable accurate species identification.

Two ultrasonic bat call recorders were used to monitor bat activity at TGO (See Figure 2-1):

- In the Biodiversity Offset Strategy Vegetation Community 1, *Inland Grey box, Poplar Box, White Cypress Pine all woodland on red loams* (Figure 1-3), near the TGO residue storage facility (RSF) (Plate 2-1)
- In the Biodiversity Offset Strategy Vegetation Community 5, *Belah / Black Oak, Western Rosewood, Wilga Woodland* (Commonly known as the 'Belah block').

Recorded calls were analysed by bat specialist, Heidi Kolkert, using Analook V4.1 bat call analysis software.

Figure 2-1: Location of bat monitoring equipment

Plate 2-1: Installing bat monitoring equipment at TGO

1.1.3 Small mammals and reptiles

Small mammal monitoring for this survey aimed to address the BMP outlined Site Specific Procedure:

3. Fat-tailed Dunnart monitoring as a means of population census and to gather relevant species management information.

Fifty (50) Type A Elliot traps were spaced at five metre intervals for three consecutive nights. The Elliot traps were located at opposite ends of the TGO property, one along the western bank of Gundong Creek and the other along the eastern boundary of the TGO property (Figure 2-2). Cumulatively this totalled 150 Type A Elliot trap night's meeting the NSW DECC Draft Survey Guideline (2004) requirement.

A camera trap was also used over three nights to record nocturnal fauna activity and other incidental animals in the 'Belah block' observing an artificial hollow installed by TGO (Plate 2-2).

Figure 2-2: Location of mammal traps

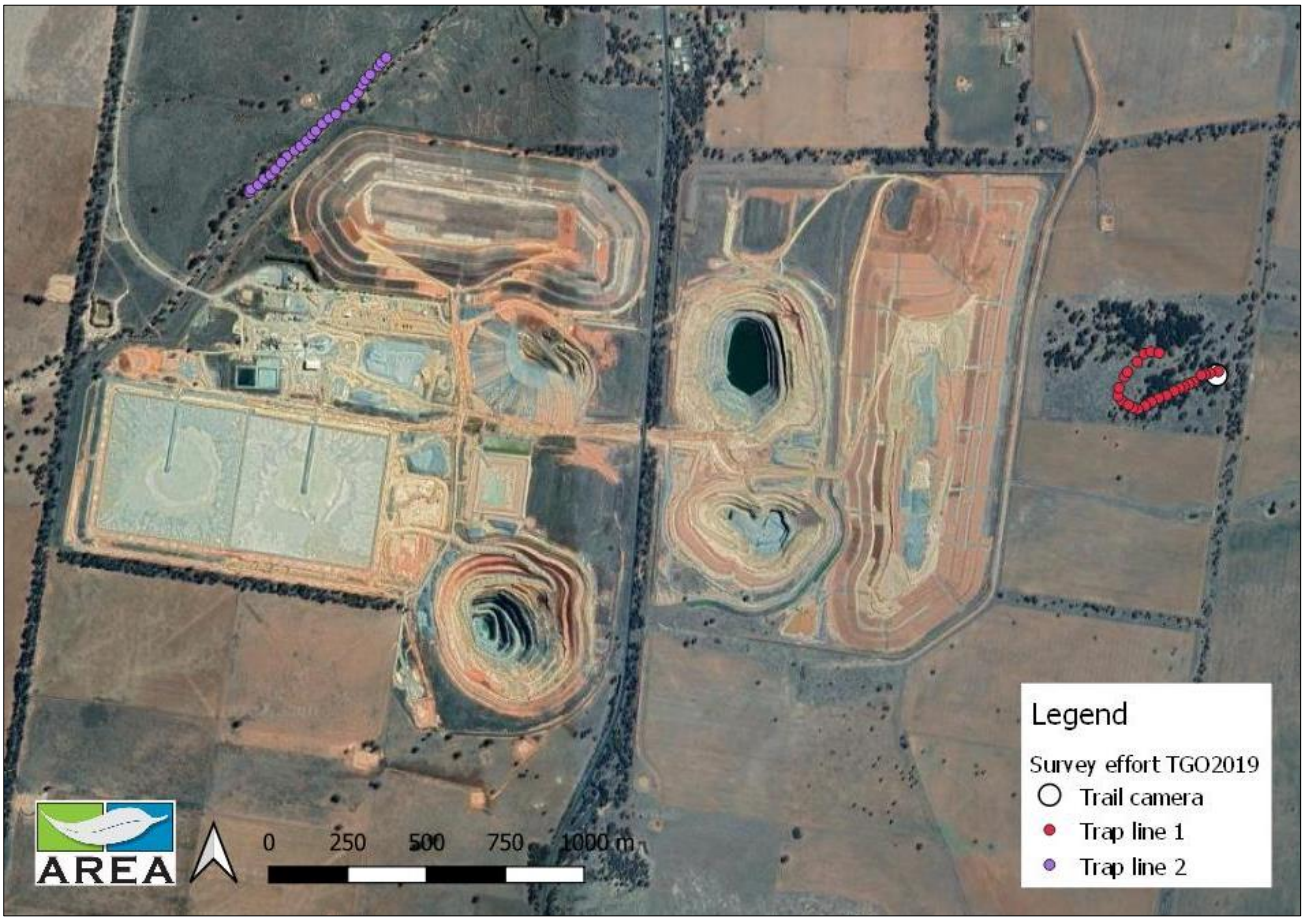


Plate 2-2: Artificial hollow observed via camera trap

1.1.4 Amphibians

A frog survey was undertaken as a combination of nocturnal searches and call surveys in the drainage line that runs behind the TGO administration offices, where there is a constant water supply and an abundance of aquatic habitat, and in a dam located near the Tomingley township, in the Biodiversity Offset Strategy Vegetation Community 3, *River Red Gum riverine woodland forest,* see Figure 2-3*.* This dam did not have water in at the time of survey, but it had only recently dried up and there was an abundance of insects and aquatic habitat in and around the dam. Another dam south of the mine entrance had water in it at the time but was not surveyed as it was lacking in aquatic habitat which would attract insects and amphibian species. There was no water in Gundong Creek at the time of survey.

Figure 2-3: Frog monitoring locations

1.1.5 Cyanide impact

Cyanide monitoring for this survey aimed to address the BMP outlined Site Specific Procedure:

4. Cyanide impact on native fauna as described in Section 8.1.

This was undertaken via visual inspection of the residue storage facility and onsite review of TGO records regarding cyanide impacts on native fauna.

1.1.6 Pest fauna species

Vertebrate pest surveys were conducted by opportunistic sighting of animals or signs of the animals during all other surveys, with the results recorded as presence or absence of the pest species.

3 Survey Effort

Field survey for the 2019 biodiversity monitoring program was completed by AREA Ecologists Addy Watson and Genevieve Peel during 16 to 19 December 2019 (four days). The survey followed the methodology outlined in the above sections.

3.1 Conditions of the assessment

The nearest weather monitoring station recorded on the Bureau of Meteorology (BoM) website is at Tomingley. Average annual rainfall for Tomingley is 590.7 millimetres (Bureau of Meteorology, 2020), see Table 3-2. Twelve-month rainfall for Tomingley prior to fauna monitoring was 329.2 millimetres, well below the annual average of 590.7 millimetres (Table 3-1). In fact, all three years since the previous monitoring event had below average rainfall (see orange highlighted rows). By comparison, previous monitoring events in 2011 and 2016 followed years of higher than average rainfall (see green highlighted rows). This monitoring event was undertaken during a time of extreme drought.

Weather was hot and sunny and there was a high degree of smoke and dust haze. Daily maximum temperature during the monitoring event at Peak Hill Post Office Weather Station (12 kilometres south of TGO) ranged from 34.6 – 41.0ºC (BoM, 2020).

Table 3-1: Tomingley (Gundong) weather station rainfall statistics

(*Lat: 32.56° S; Lon: 148.34° E; Elevation: 355m)*

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2010	11.6	139.2	80.6	68.4	67.6	34.4	107.2	65.8	79.8	73	129.2	158	1014.8
2011	8.2	68.3	42.2	50.6	58	-	12.4	55	59.8	42.6	102.4	76.8	576.3*
2012	62.4	42.8	147.4	2.8	35.2	30.6	55.2	3.8	39.4	11.4	34	7.2	472.2
2013	21.8	29.4	97.8	8.8	19	119	41.2	7.2	49.2	9	15	37.6	455
2014	43.2	57.2	128.8	57.6	32.2	70.3	30.2	17.2	24.8	19.6	18.2	80.8	580.1
2015	105.4	12.8	8.4	113.4	49.6	40.4	94.4	29.4	4	72.8	101	51.6	683.2
2016	133.8	1.8	16.8	32.4	70.2	161.3	153.2	80.6	181	60	57.4	129.4	1077.9
2017	9.6	0.6	96.6	20.2	39.2	4	0.8	26.2	13	87.4	41	109.4	448
2018	47.8	1.6	6	-	12	27.6	3.8	30.8	24.6	52	108.4	32.2	346.8*
2019	95.2	34.4	61.2	0	18.2	23.4	12.4	10.8	20.4	8.2	39	6	329.2

**incomplete data*

Table 3-2: Rainfall summary statistics for all years (Source: BoM)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	61.2	38	51.4	39.5	44.2	43	49.3	42.9	44.6	49.5	57.3	50.1	590.7
Lowest	7.4	0	0	0	0.4	1.8	0	0	0.8	1	0	0	285.1
5th %ile	8.9	1.5	0	0	2	4	5.3	4	3.9	6.8	3.1	2.9	317.7
95th %ile	169.6	90.8	144.2	129.5	112.9	113.7	122.9	114.3	116.7	111.6	125.6	121.4	964
Highest	201.6	139.2	178.5	352	167.1	161.3	153.2	133.5	181	140.3	148.8	178.8	1077.9

3.2 Constraints

Not all animals and plants can be fully accounted for within any given study area.

The presence of animals and plants changes over time and in response to changes in environmental conditions. This report presents data collected during the 2019 monitoring event to meet objectives outlined in Section 2-2 above and is indicative of the species present and site condition at the time of the assessment.

4 Results

4.1 Fauna Species Richness

During 2019 monitoring, 38 species were recorded (Table 4-1). Of these 38 species, 22 were birds, nine were bats, three were mammals and four were amphibians. No fauna was detected on camera traps or in the Elliot traps. Two threatened species, Grey-crowned Babbler *Pomatostomus temporalis temporalis* and Southern Myotis *Myotis macropus* were recorded.

Fauna survey in 2011 recorded 134 vertebrate species and the 2016 survey recorded 41 species. These figures indicate a trend of declining fauna since 2011, though this trend should be treated with care. The 2011 assessment had a much higher degree of survey effort in a much broader study area to meet project approvals and both previous surveys were preceded by higher than average rainfall, whereas the 2019 monitoring follows three years of below average rainfall.

Additionally, the objective of the 2019 fauna monitoring event was to meet the objectives and monitoring targets outlined in Section 2.2, with targeted species searches undertaken and opportunistic sighting of other species recorded, rather than a complete fauna survey.

Table 4-1: Fauna survey results

Common Name	Scientific name	Listed?	Exotic?
BIRDS			
Zebra Finch	*Taeniopygia guttata*		
Willy Wagtail	*Rhipidura leucophrys*		
Quail (Brown?)	*Coturnix ypsilophora*		
Galah	*Eolophus roseicapilla*		
Magpie	*Gymnorhina tibicen*		
Australian Reed Warbler	*Acrocephalus australis*		
Starling	*Sturnus vulgaris,*		Y
Apostle Bird	*Struthidea cinerea*		
Laughing Kookaburra	*Dacelo novaeguineae*		
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		
White-winged Chough	*Corcorax melanorhamphos*		
Grey Crowned Babbler	*Pomatostomus temporalis*	BC - V	
Noisy Miner	*Manorina melanocephala*		
Nankeen Kestrel	*Falco cenchroides*		
Australasian Pippet	*Anthus novaeseelandiae*		
Peewee/Magpie Lark	*Grallina cyanoleuca*		
Pied Butcher bird	*Cracticus nigrogularis*		
Eastern Rosella	*Platycercus eximius*		
Welcome Swallow	*Hirundo neoxena*		
Crested Pigeon	*Ocyphaps lophotes*		
Blue Bonnet	*Northiella haematogaster*		
Red-rumped Parrot	*Psephotus haematonotus*		
MAMMALS			

Common Name	Scientific name	Listed?	Exotic?
European Hare	*Lepus europaeus*		Y
European Red Fox	*Vulpes Vulpes*		Y
Eastern Grey Kangaroo	*Macropus giganteus*		
AMPHIBIANS			
Crinea sp. (C. parinsignifera or C. signifera)	*Crinea sp.*		
Spotted or Striped marsh Frog	*Limnodynastes tasmaniensis* or *Limnodynastes peronii,*		
Peron's tree Frog	*Litoria peronii*		
Broad Palmed Rocket Frog	*Litoria latopalmata*		
BATS			
Chocolate wattled bat	*Chalinolobus morio*		
Gould's wattled bat	*Chalinolobus gouldii*		
Long-eared bats	*Nyctophilus sp.*		
Little bentwing bat	*Miniopterus australis*		
Inland broad-nosed bat	*Scotorepens balstoni*		
Little broad-nosed bat	*Scotorpens greyii*		
Eastern broad-nosed bat	*Scotorepens orion*		
Little forest bat	*Vespadelus vulturnus*		
Fishing bat	*Myotis macropus*	BC - V	

4.1.1 Grey-crowned Babbler

Background

The 2011 Ecology Assessment states TGO has adopted the Grey-crowned Babbler (GCB) as a flagship species and have produced a brochure to raise awareness of the species within the area and organisation (Appendix A).

The 2011 survey concluded:

"Within the Mine Site Study Area it was considered that two families of eight to ten individuals. Possibly one family east of the Newell Highway and the other west of the Newell Highway but this could not be determined by the end of the field assessment."

The 2016 survey recorded:

"a breeding pair of Grey Crowned Babblers was recorded in the Grey Crowned Babbler habitat area of the TGO property"

but did not specify the exact location of the sighting.

Anecdotal reports from staff say GCB have been seen in three different locations on the TGO property, one east of the Newell highway and two on the western side. Signs throughout the survey area indicates where there are known populations of GCB's, as well as heritage items and offset areas.

Result

Population census in 2019 recorded GCB at two of their three previously known locations. Results are shown in Figure 4-1. Seven individuals were observed in two separate locations

and are assumed to be two separate families. Many GCB distinctive nests were also observed (see example Plate 4-1).

Figure 4-1: Grey-crowned Babbler population census results

Family sizes are smaller than those recorded in 2011, but this may relate to the current climatic constraints. GCB are definitely still present in the area and should increase as the quality of habitat in the biodiversity areas increases with the age of the trees.

Plate 4-1: Grey-crowned babbler nest in the study area

No active populations were observed in the Grey Box Community south of the residue storage facility where there are multiple nests in various states of repair. This area is off the mine site however it is still relevant given the close proximity of the mining operations.

Bird counts for 2019 totalled 22 species (see Section 4.1). The overall bird diversity is similar to the 2016 results of 25 species.

4.1.2 Bats

Eight bat species were recorded in 2011 and 11 were recorded in 2016/17. Additionally, the TGO Annual Environmental Management Report for 2014 stated during a bat survey in October of that year 15 species of microbat were potentially recorded, including three species listed as vulnerable under the NSW Threatened Species Conservation Act 1995 (TSC Act) confidently identified, with a further two potentially identified.

2019 showed a similar bat diversity to 2016/17 with at least nine species of bat positively recorded (Appendix B). Three Nyctophilus species (*Nyctophilus gouldi, N. geoffroyi and N. corbeni*) have the potential to occur in the region and overlap almost entirely in most pulse characteristics.

Table 4-2 shows the comparison of bat species recorded within the mine site over the previous fauna monitoring events. Three species (highlighted) recorded in 2019 have not been recorded previously.

Table 4-2: Bat species recorded comparison table

Common Name	Scientific Name	Status	2011	2014*	2016	2019
Chocolate Wattled Bat	*Chalinolobus morio*		X	X	X	X
Little Pied Bat	*Chalinolobus picatus*	BC - V	X	X	X	
Eastern Bentwing Bat	*Miniopterus schrebersii oceanensis*	BC- V	X	X	X	
Little Forest Bat	*Vespadelus vulturnus*		X	X	X	X
Gould's Wattled Bat	*Chalinolobus gouldii*		X	X	X	X
Little Broad-nosed Bat	*Scotorpens greyii*		X		possible	
Southern Freetail Bat	*Mormopterus planiceps*		X	X	X	
White-striped Freetail Bat	*Austronomus australis*		X	X	X	
Inland Free-tailed Bat	*Mormopterus (Ozimops) petersi*			X	X	
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	BC-V		X	X	
Beccari's Free-tailed Bat	Mormopterus (Ozimops) beccarii			X		
Eastern Cave Bat	*Vespadelus troughtoni*	BC - V		X		
Large Forest Bat	Vespadelus darlingtoni			X		
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	BC - V		X		
Inland Broad-nosed Bat	*Scotorepens balstoni*			X	X	X
Long Eared Bats	*Nyctophilus sp.*			X		X
Little Bentwing Bat	*Miniopterus australis*					X
Eastern Broadnosed Bat	*Scotorepens orion*					X
Southern Myotis	*Myotis macropus*	BC - V				X
***** BC – V sp. Large-eared Pied Bat *Chalinolobus dwyeri* and Inland Forest Bat *Vespadelus baverstocki* also potentially recorded in 2014 but not confidently identified		**Total**	**8**	**15**	**11**	**9**

Several calls were attributed to Southern Myotis *Myotis macropus*, which is a BC Act Vulnerable species and is a new record for the area. The OEH threatened species profile for Southern Myotis states the species has;

"disproportionately large feet; more than 8 mm long, with widely-spaced toes which are distinctly hairy and with long, curved claws. It generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage and forages over streams and pools catching insects and small fish by raking their feet across the water surface".

It would be worthwhile spotlighting near water sources in the study area, to verify the presence of *Myotis Macropus* during future monitoring or assessment events.

The abundance of bat species present over the years indicates that the local area has diverse habitat resources suitable for a variety of microbat species. These species probably rely on local water resources for drinking and food resources. Additionally, TGO is often artificially lit

at night, which attracts a high number of insects, which is turn can attract high number insectivorous bat species. In 2014, the survey placed a detector which was aimed at a mature Silky Oak (*Grevillia robusta*) in full flower (attracting insects) that was itself in an area artificially lit with floodlights (also attracting insects) all night, which may account for a higher number of species recorded that year.

4.1.3 Native Mammals

Only one species of native mammal, Eastern Grey Kangaroo *Macropus giganteus*, was recorded at Tomingley in 2019. This species is common.

Pedestrian surveys on the 6th of August 2009 recorded a dead female fat-tailed dunnart within the mine site on the eastern side of the Newell highway. At the time this species was a regionally significant species (no additional legislative consequence but a species of conservation concern). It is not currently listed as a threatened species and has not been recorded in the area again. The related threatened BC Act species, Stripe faced Dunnart *Sminthopsis macroura* also has the potential to occur. Neither species was recorded in 2019.

During the 2019 assessment, the Type-A Elliot traps did not trap any animals and the camera trap did not record any fauna using the artificial nest box. This may be due to low densities of fauna in the mine site area, especially during the current conditions of extreme drought. Anecdotal evidence from mine staff reports that none of the artificial next boxes installed throughout the mine site have been observed being used.

4.1.4 Amphibians

Two frog species were identified by call surveys in the drainage line that runs behind the TGO administration offices. One was confidently identified as the common Peron's Tree Frog *Litoria peronii.* The other was either Spotted Marsh Frog *Limnodynastes tasmaniensis* or Striped Marsh Frog *Limnodynastes peronii*, both common species.

A nocturnal search in the dam located near the Tomingley township found an abundance of insects and individual frogs. Two species additional species were recorded, including one very small froglet species.

Broad Palmed Rocket Frog *Litoria latopalmata* was confidently identified by its appearance (Plate 4-2). The froglet (Plate 4-3) could not be confidentially identified and, due to the possibility of the BC and EPBC threatened species Sloane's Froglet *Crinia sloanei* being present in the area, AREA consulted with a DPIE Senior Threatened Species Officer. DPIE confirmed the individuals are definitely *Crinia sp.*, probably *C. parinsignifera* or *C. signifera* but without calls a positive identification cannot be made. They're almost definitely not *C. sloanei.*

Broad Palmed Rocket Frog *Litoria latopalmata* is a new record for the area.

Plate 4-2: Broad Palmed Rocket Frog *Litoria latopalmata* at TGO

Plate 4-3: *Crinia sp.* recorded at TGO

4.1.5 Cyanide

The TGO BMP includes a section on 'Management and Monitoring Program for Cyanide Impact on Site'. Under the BMP, the residue storage facility (RSF) is to be operated in accordance with certain strategies to limit the potential for cyanide impact on fauna. The strategies, along with AREA's assessment of these strategies, are outlined below, Table 4-3.

Table 4-3: TGO cyanide management strategies assessment

Strategy	Achieved?	Reasoning
A cyanide destruction circuit has been included in the design of the processing plant to ensure that WAD cyanide concentration reporting to the RSF is less than 30mg/L and the 90th percentile discharge limit is less than 20mg/L as per the requirements of EPL 20169.	Yes	TGO must abide to the conditions of their Environmental Protection Licences, as monitored by EPA.
A fauna exclusion fence has been constructed surrounding the process water dam. The dam is the only location on site where cyanide concentrations could be injurious to fauna. The fence is constructed of 1.8m chain mesh fence (to exclude large mammals) and fine mesh skirt at the base (to exclude small mammals and reptiles).	Yes	The exclusion fence is established and has been maintained to ensure its integrity.
Aquatic vegetation is maintained around the perimeter of farm dams retained within the Biodiversity Offset Area and other non-operational TGO land to assist in preserving attractive bird habitat away from the RSF.	Yes	As far as possible alternative habitat is maintained.
Maintaining minimal decant water on the RSF so as not to attract fauna.	Yes	Site inspection on 16 December 2019 revealed minimal decant water on the RSF and no fauna present. Water levels are generally consistent with aerial images of TGO used in previous figures of this report.

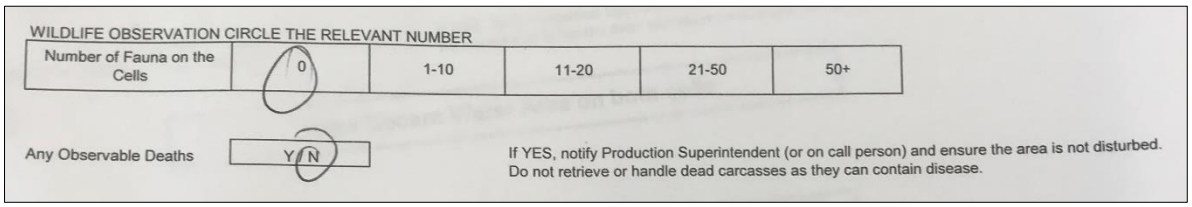
The 2018 TGO BMP also outlines a cyanide monitoring plan (the BMP has since been modified in this aspect for 2020), which aims to assess cyanide impact on wildlife, focusing on routine wildlife inspections and mortality observations. The 2018 plan is outlined below:

- Processing personnel carryout wildlife observation surveys twice a day. Surveys are conducted for 30 minutes within three hours of sunrise and at the beginning of night shift.
- Wildlife observation counts will provide an indication of wildlife visitations and mortality associated with RSF.
- Habitat utilisation is recorded as either:
    - Supernatant
    - Beach
    - Aerial
    - Wall
    - Dry Tails
    - Wet Tails
- Weather conditions, behaviour of wildlife, number of visitations, estimate of supernatant on top of the tailings (as percentage of tailings dam area) and the percentage of solids in discharged tailings for that day are also recorded.
- Carcases removed from the RSF, or discovered elsewhere on site, will be taken to a local veterinary surgery for cyanide/ cause of death investigations.
- If a carcass is encountered, the species must be confidently identified.

- Opportunistic observations of wildlife deaths will also be recorded.
- WAD cyanide concentrations are measured at discharge into the tailings facilities on a daily basis as per the TGO Environmental Protection Licence.

AREA reviewed TGO's daily RSF data inspection sheets from approximately the last three months. These sheets, as well as meeting conditions of their Environmental Protection License, as monitored by EPA, should include detailed fauna observations as outlined above, to meet TGO's BMP monitoring conditions. This information is then used to quantify cyanide impacts on wildlife. A copy of a completed RSF record sheet is shown in Appendix D.

The extract below shows the actual wildlife observations that are currently being recorded, which did not meet the monitoring conditions of the 2018 BMP:


WILDLIFE OBSERVATION CIRCLE THE RELEVANT NUMBER

Number of Fauna on the Cells	0	1-10	11-20	21-50	50+

Any Observable Deaths Y / N

If YES, notify Production Superintendent (or on call person) and ensure the area is not disturbed. Do not retrieve or handle dead carcasses as they can contain disease.

The BMP has concurrently been reviewed as more detailed wildlife observations are needed to provide useful information about wildlife interactions with the RSF. In order to meet the monitoring conditions of the BMP, the RSF data inspection sheets have been revised, see example Appendix D.

Environmental Monitoring Reports (http://www.alkane.com.au/projects/tomingley-gold-operations/tgo-environment/environmental-reports/) for TGO dating back to July 2013 were also referenced. The 'Biodiversity Monitoring' section of these reports was summarized and is recorded in Appendix E. Overall these reports show a decline in wildlife records and deaths at the RSF.

Over approximately six years of operation there have been three fauna deaths associated with the RSF recorded in the Environmental Monitoring Reports, one magpie, the other two species unknown. No fauna deaths were recorded at the RSF in 2018 and 2019.

4.1.6 Bio-indicator species

In OzArk's 2016 report, it refers to birds as bio-indicators and the following bird species were selected as the most relevant bio-indicator species for the project site and the monitoring objectives:

- Superb Parrot *Polytelis swainsonii*
- Brown Treecreeper *Climacteris picumnus*
- Eastern Yellow Robin *Eopsaltria australis*
- Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis*
- Eastern Barn Owl *Tyto alba*

An indicator species can be described as "A species whose characteristics (e.g. presence or absence, abundance, density, mortality rate, breeding success) indicate the condition of ecosystems, the status of other taxa, the presence and impacts of stressors, or patterns of biological diversity" (Carrignan & Villard, 2002).

2019 bird monitoring was limited to a population survey of Grey-crowned Babblers, with opportunistic sightings of other species recorded. This was the only bio-indicator species recorded in this monitoring event.

Increased time allocated for monitoring would be required to undertake targeted bird transects to monitor bird bio-indicators.

4.1.7 Pests

Two feral mammal species were recorded at the project site in 2019:

- Rabbit (*Oryctolagus cuniculus*).
- Fox (*Vulpes vulpes*).

An active fox den, with a fox seen in residence, was located on the banks of Gundong Creek, Plate 4-4, within approximately 250 metres east of the administration office complex at TGO. Fresh fox scat in close proximity was full of beetle exoskeletons which the individual responsible must have recently been feeding on Plate 4-5.

This is consistent with the lack of results AREA experienced with small animal trapping and indicates there may indeed be a deficiency of small mammals and reptiles in the area. This may be due to climatic challenges, as previously discussed, however the presence of the European fox would also be impacting populations.

Plate 4-4: Active fox den located on TGO property

Plate 4-5: Fresh fox scat located near den

The close proximity of the den to TGO operations and the indicated lack of desirable diet available in the current conditions indicate it would be an ideal time to attempt to trap and eliminate European Fox from the site.

Review of the Environmental Monitoring Reports, Appendix E show a decline in vertebrate pest monitoring at TGO:

- From August 2013 to January 2017 vertebrate pest trapping results were recorded and indicated a trapping program has been ongoing.
- Since June 2018, Biodiversity Monitoring results have been limited to “No fauna deaths were recorded” and pest control has not been reported on.

Over the years a number of feral cats *Felis catus* and one juvenile fox have been captured and euthanased by a veterinarian, indicating the importance of an ongoing vertebrate trapping program.

Abundant native herbivores, Eastern Grey Kangaroos, are not currently considered a pest species. The population of Eastern Grey Kangaroos occupying the TGO land will be monitored, where population management is required it will be implemented under an DPIE licence and a management plan.

4.2 Monitoring objectives

AREA's assessment of the relevant objectives of the TGO BMP, as outlined in Section 2.2 of this report are shown below. The BMP has a contradiction in terms over whether monitoring should be occurring annually or two-yearly. Review and update of the BMP should address this inconsistency.

Table 4-4: TGO biodiversity management objectives and targets.

Objectives	Target	Timeframe	Achieved?	Comments
Protection of Grey-crowned Babblers (eastern sub-species) and their habitat	• Schedule any clearing outside breeding period (spring). • Retain fallen timber and leaf litter from under remnant vegetation. Nesting continues successfully.	Monitor nest construction and use annually	Yes	GCB were confirmed as present. Further monitoring is recommended to confirm their current distribution. Monitoring has not been occurring annually
Monitor Grey-crowned Babbler population.	• Implement monitoring annually. Resident population remains.	Two yearly monitoring	Yes	As above
Monitor frog population.	• Implement monitoring annually. Maintain frog habitat within the Biodiversity Offset Area.		Yes	Four amphibians were recorded. Further monitoring is recommended to survey for additional species.
Monitor Fat-tailed Dunnart population.	Implement and report monitoring annually.		Yes	No Fat-tailed Dunnart were recorded.
Monitor microbat population.	• Implement and report monitoring annually. Populations of microbats are not reduced.		Yes	Nine bat species were recorded.
Increase or maintain habitat value at the time of mine closure.	• Implement habitat enhancement and extension directives stated within PVP document. Implement targeted fauna monitoring as explained above in this table.	Biodiversity Offset Area secured early 2015 Biodiversity and fauna monitoring occurs annually.	Yes	Fauna monitoring has not been occurring annually.

Objectives	Target	Timeframe	Achieved?	Comments
Minimise or prevent cyanide related fauna deaths.	• Samples of maximum WAD cyanide concentration released to the RSF is less than 30mg/L and the 90th percentile limit is less than 20mg/L. Zero animal deaths from exposure to RSF.	Ongoing	Yes	TGO's RSF Wildlife reporting needs review to meet BMP monitoring objectives.

5 Conclusions

This document addressed four specific monitoring actions recommended by the TGO Biodiversity Management Plan and made the following conclusions:

- Grey-crowned babbler were confirmed to still be present around the mine site at two of their three known locations, and population should improve as habitat values in the biodiversity offset areas improve
- Four Amphibian species were recorded in healthy aquatic environment
- No Fat Tailed Dunnarts, nor any other small native mammal or reptile, were recorded during the monitoring event
- Cyanide was not considered to be having a significant effect on fauna, however in order to meet the monitoring conditions of the BMP, it is recommended the RSF data inspection sheets are revised.

This was not a full biodiversity assessment, however survey indicated there is still moderate diversity in the fauna within the mine site which is on par with previous assessments. The Tomingley area is currently experiencing extreme drought conditions which affect fauna population and distribution. As rainfall returns to more regular patterns and fauna habitat within the mine site improves and becomes more established, fauna diversity and abundance should also increase.

A decline in general fauna observations in the TGO mine site has been observed. While it is not a requirement to make regular fauna observations, it can help determine ongoing impact of the mining operations and to give a better indication of fauna diversity on a day to day basis.

6 Recommendations

The following recommendations are made to ensure that the proponent is on target to meet the monitoring objectives:

- Continue feral animal control monitoring (foxes, cats and rabbits) and eradicate the fox seen to be living on the mine site
- Undertake more regular informal GCB population checks to establish if range and population has declined, or continues to decline
- Undertake nocturnal survey to confirm the presence of BC Act threatened bat species *Myotis macropus* in association with a future monitoring or assessment effort
- Update BMP and/or cyanide monitoring protocols so they are consistent, achievable and relevant
- Increased time allocated for monitoring to undertake targeted bird transects to monitor bird bio-indicators
- Undertake and record more general observations and record these in the Monthly Environmental Monitoring Reports to give a better indication of fauna diversity on a day to day basis.

7 References

Benson, J. (2009). *New South Wales Vegetation Classification and Assessment, NSWVCA batabase.* Sydney: NSW DEC.

BoM. (2016, May 26). *Climate Statistics for Australian Locations: Peak Hill Post Office*. Retrieved from http://www.bom.gov.au/jsp/ncc/cdio/wData/wdata?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=050031

Office of Environment and Heritage. (2017). *Biodiversity Assesssment Methodology.* Sydney: NSW Government.

Office of Environment and Heritage. (2017). *Vegetation Information System (online)*. Retrieved from Vegetation Information System (online): http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx

Ozark Environmental & Heritage Management Pty Ltd (2011) *Tomingley Gold Project Ecology Assessment* http://www.alkane.com.au/wp-content/uploads/2017/12/61606_Part-4_Ecology_Final.pdf

Ozark Environmental & Heritage Management Pty Ltd (2016) *Tomingley Gold Operations Biodiversity Monitoring: 2016*

Thackway, R. a. (1995). *An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program, Version 4.0.* ACT: Australian Nature Conservation Agency.

Tomingley Operations (2020) *Environmental Assessment Documents* (online) http://www.alkane.com.au/projects/tomingley-gold-operations/tgo-environment/environmental-assessment/

Tomingley Gold Operations (2018) *Biodiversity Management Plan*

Appendix A – Grey-crowned Babbler information brochure

In the Tomingley area, the most valuable and important babbler habitat is the remnant tree corridors which connect our properties.

Tomingley Gold Operations is committed to protecting remnant habitat and monitoring the Grey-crowned Babbler.

TOMINGLEY
GOLD OPERATIONS PTY LTD
(A wholly owned subsidiary of Alkane Resources Ltd)

What can you do to support this threatened species?

Scientific name: Pomatostomus temporalis temporalis
Conservation status in NSW: Vulnerable

Grey-crowned Babblers

Tomingley Gold Mine: Tomingley West Road, Tomingley NSW 2869
Telephone: +61 2 6867 9780 mail@alkane.com.au www.alkane.com.au

ALKANE RESOURCES LTD

MULTI-COMMODITY MINER EXPLORER
www.alkane.com.au

Family is everything...

Grey-crowned Babblers live in family groups consisting of a breeding pair and their offspring forming groups of up to 15 birds. The group stays close together while looking for food and make soft 'chuck' calls to keep in touch.

The family group work together to build and maintain nests as well as to feed the young.

Their nest are conspicuous football shaped nests made from sticks which are usually in the small outermost branches of eucalypts. They will maintain up to ten nests, using most of them for roosting and only a few that are large enough for incubating eggs, like the one in the picture.

Breeding occurs from mid-winter through to the end of summer.

What you can do to help.

- Remember that vegetation corridors are very important. They provide habitat for the wildlife including Grey-crowned Babblers. If they are along fence lines, they won't take up too much productive land.
- In your garden and in your vegetation corridors and wherever else you can, leave the fallen branches on the ground and allow leaf litter and sticks to gather too.
- Encourage regeneration of habitat by fencing remnant stands of trees.
- Increase the size of existing remnants and plant trees to establish buffer zones of pasture around woodland remnants.
- If you are a cat owner, please keep your cat indoors as much as possible.

Who are these babblers?

The Grey-crowned Babblers are one of four babbler species in Australia. They have a scimitar-shaped bill, white eyebrows that blends into a patch of grey on the top of their head. A dark band across their eye gives them a masked look. They have a brownish orange patch on their wings that you can see when they spread their wings and fly.

When they are young, their iris is brown. It fades as they age, to yellow by three years old.

Where you will see them...

Grey-crowned Babblers live in patches of Box-Gum Woodland defending territories usually around 10 hectares, but up to 50 hectares.

They search amongst the leaf litter, amongst grassy tussocks or on the branches and bark of trees for insects and other invertebrates to eat.

These birds will often glide from tree to tree or from a tree to the ground, avoiding flight when they can. For this reason, they are unlikely to cross large open areas.

...Or hear them.

This species has a loud 'ya-hoo' call which is a duet between the male and female (the female says 'ya' and the male answers with 'hoo'). It is used to maintain the bond between the pair and as a territorial call.

Appendix B – Bat Analysis report

BAT CALL ANALYSIS

4 January 2020

Client: AREA Phil Cameron
Location: Tomingley, NSW
Vegetation type: Woody vegetation surrounding mine area

Reporting standard

This report is a rapid species identification report. It does not follow the nationally accepted standards for the interpretation and reporting of bat echolocation data (Reardon 2003) as per the Australasian Bat Society on-line at http://www.ausbats.org.au/. Calls were analysed by Heidi Kolkert using Analook V4.1 bat call analysis software.

Species nomenclature

Species names used in this summary follow Churchill (2008), except for *Mormopterus (Ozimops)* species, which follow Reardon *et al.* (2014).

Call identification

Call identification is based on existing call descriptions and keys presented in Pennay et al. (2004) and Reinhold et al. (2001) as well as reference calls collected in New South Wales. Species' identification was further refined by considering probability of occurrence based on distributional information presented in Churchill (2008) and Van Dyck & Strahan (2008) and spatial data stored on the DPIE Bionet and Atlas of Living Australia (ALA 2020). Some calls lacked sufficient detail for attribution to species level (not enough pulses, noisy or weak calls).

Results

At least nine species of bat were positively recorded (**Table 1**). Three *Nyctophilus* species (*Nyctophilus gouldi*, *N. geoffroyi and N. corbeni*) have the potential to occur in the region and overlap almost entirely in most pulse characteristics. Several calls were attributed to *Myotis Macropus*, that appears to be a new record for the area. This was based on a number of features, such as, an initial slope of greater than 400 octaves per second (OPS), the shape of the pulse and mostly a pulse interval of <75ms but sometimes slightly greater. It would be worthwhile spotlighting near water sources in the study area, to verify the presence of *Myotis Macropus.*

Table 1: Insectivorous bats recorded in the study area via echolocation

		Bat 1		Bat 2		
Scientific name	Common Name	16.12.2019	17.12.2019	16.12.2019	17.12.2019	18.12.2019
Chalinolobus morio	Chocolate wattled bat	✓				
Chalinolobus gouldii	Gould's wattled bat	✓		✓	✓	✓
Nyctophilus sp.	Long-eared bats	✓	✓			
Miniopterus australis	Little bentwing bat	✓				
Scotorepens balstoni	Inland broad-nosed bat	✓	✓	✓		
Scotorpens greyii	Little broad-nosed bat	✓	✓	✓	✓	
Scotorepens orion	Eastern broad-nosed bat	P				
Vespadelus vulturnus	Little forest bat	✓	✓			
Myotis macropus#	Fishing bat	✓	✓			
	Number of bat calls	***42***	***68***	***30***	***10***	***5***

✓ Species identified in the study
P Potential record of species and number of passes.
species listed under the Biodiversity Conservation Act 2016
* species listed under the Environmental Protection and Biodiversity Act

References:

Atlas of Living Australia (2020). https://biocache.ala.org.au/explore/your-area#-32.5679|148.2220|12|ALL_SPECIES, Accessed 3 January 2020

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Reardon, T. (2003). *Standards in bat detector-based surveys*. Australasian Bat Society Newsletter 20, 41-43.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales. Department of Natural Resources and Mines, Brisbane*.

Van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition); New Holland; Sydney.

Appendix C – Current RSF reporting at TGO

RESIDUE STORAGE FACILITY

Name [redacted] Date 3-10-19 Shift: am / pm (D/S) or N/S

CONDITION INSPECTIONS		TIME 630	TIME 1600
Water Against Walls Inside RSF		Y (N)	Y (N)
Pipeline - Any leaks?		Y (N)	Y (N)
Dam Wall- Any cracks, erosion or slumping?		Y (N)	Y (N)
Water Freeboard	< 1.0m	Y (N)	Y (N)
Slurry Freeboard	< 0.5m	Y (N)	Y (N)
Seepage - Any signs of seepage from RSF?		(Y) N	(Y) N

South Wall drainage		
Time	630	1600
Totaliser (m^3)	9.8	9.9

WILDLIFE OBSERVATION CIRCLE THE RELEVANT NUMBER

Number of Fauna on the Cells	0	1-10	11-20	21-50	50+

Any Observable Deaths Y (N)

If YES, notify Production Superintendent (or on call person) and ensure the area is not disturbed. Do not retrieve or handle dead carcasses as they can contain disease.

Draw Decant Water Area on both cells

Cell 1 Decant Pond Area (%)

Cell 2 Decant Pond Area (%)

Comments

Safety / Environmental

If YES for any of the above make a comment below.

Appendix D – Revised RSF Record Sheet

RESIDUE STORAGE FACILITY

Name: Date Shift: am / pm D/S or N/S

CONDITION INSPECTIONS	TIME	
Water Against Walls Inside RSF	Y / N	Y / N
Pipeline - Any leaks?	Y / N	Y / N
Dam Wall- Any cracks, erosion or slumping?	Y / N	Y / N
Water Freeboard < 1.0m	Y / N	Y / N
Slurry Freeboard < 0.5m	Y / N	Y / N
Seepage - Any signs of seepage from RSF?	Y / N	Y / N

South Wall Drainage		
Time		
Totaliser (m^2)		

WILDLIFE OBSERVATIONs: CIRCLE THE RELEVANT OBSERVATION

Weather	Hot	Cold	Windy	Rainy		
Number of Fauna on the Cells	0	1	2-5	6-10	11-25	25+
Type of Fauna	Bird	Kangaroo	Other mammal	Reptile	Other	
Fauna Location	Wall	Dry tailings	Wet tailings			

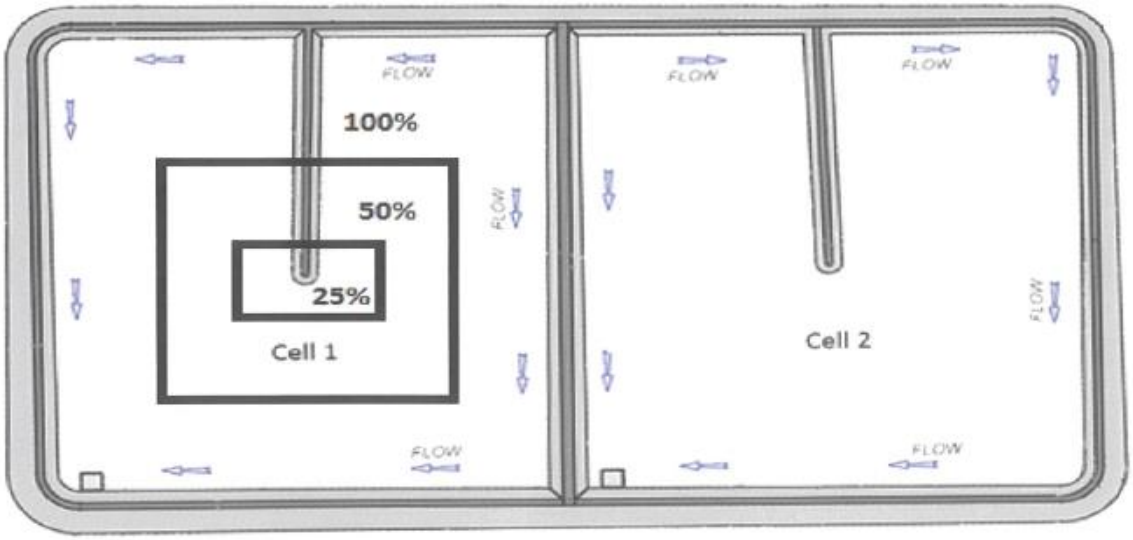
Any Observable Deaths Y / N

If YES, notify Production Superintendent (or on call person) and ensure the area is not disturbed. Do not retrieve or handle dead carcasses as they can contain disease.

Draw Decant Water Area on both cells

Cell 1 Decant Pond Area (%)

Cell 2 Decant Pond Area (%)



Comments

Safety/Environmental
If YES for any of the above make a comment below:

Appendix E – Biodiversity Monitoring at TGO

A summary of TGO Monthly Environmental Monitoring Reports Biodiversity Monitoring, July 2013 – November 2019

(Results of interest have been highlighted)

Date	Fauna Deaths	Vertebrate Pests	Site Fauna
Nov-19	No fauna deaths were recorded during November		
Oct-19	No fauna deaths were recorded during October.		
Sep-19	No fauna deaths were recorded during September.		
Aug-19	No fauna deaths were recorded during August.		
Jul-19	No fauna deaths were recorded during July.		
Jun-19	No fauna deaths were recorded during June		
May-19	No fauna deaths were recorded during May.		
Apr-19	No fauna deaths were recorded during April.		
Mar-19	No fauna deaths were recorded during March		
Feb-19	No fauna deaths were recorded during February		
Jan-19	No fauna deaths were recorded during January		
Dec-18	No fauna deaths were recorded during December		
Nov-18	No fauna deaths were recorded during November		
Oct-18	No fauna deaths were recorded during October		
Sep-18	No fauna deaths were recorded during September.		
Aug-18	No fauna deaths were recorded during August		
Jul-18	No fauna deaths were recorded during July		
Jun-18	No fauna deaths were recorded during June		
May-18	No fauna deaths were recorded during May	A program of trapping feral cats and foxes has continued with one feral cat being captured during May	
Apr-18	No fauna deaths were recorded during April.	A program of trapping feral cats and foxes has continued with no feral cats being captured during April.	
Mar-18	No fauna deaths were recorded during March	A program of trapping feral cats and foxes has continued with no feral cats being captured during March.	
Feb-18	No fauna deaths were recorded during February	A program of trapping feral cats and foxes has continued with no feral cats being captured during February	
Jan-18	Could not open report		
Dec-17	No fauna deaths were recorded during December	A program of trapping feral cats and foxes has continued with no feral cats being captured during	

		December	
Nov-17	No fauna deaths were recorded during November	A program of trapping feral cats and foxes has continued with no feral cats being captured during November	
Oct-17	No fauna deaths were recorded during October	A program of trapping feral cats and foxes has continued with no feral cats being captured during October	
Sep-17	Two animals were found deceased in the RSF during the course of September. Analysis revealed that their deaths were not cyanide related and the events were reported to the EPA as per TGO's EPL conditions	A program of trapping feral cats and foxes has continued with no feral cats being captured during September.	
Aug-17	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with no feral cats being captured during August.	
Jul-17	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with one feral cat being caught during July	
Jun-17	There were no fauna deaths in the RSF for the month	A program of trapping feral cats and foxes has continued with no animals being caught during June	
May-17	There were no fauna deaths in the RSF for the month	A program of trapping feral cats and foxes has continued with a single feral cat being captured during May	
Apr-17	There were no fauna deaths in the RSF for the month	A program of trapping feral cats and foxes has continued with no animals being captured throughout April	
Mar-17	There were no fauna deaths in the RSF for the month	A program of trapping feral cats and foxes has continued with no animals being captured throughout March	
Feb-17	There were no fauna deaths in the RSF for the month	A program of trapping feral cats and foxes has continued with no animals being captured throughout February	
Jan-17	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with no animals being captured throughout January	
Dec-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with no animals being captured throughout November (sic)	A number of fauna sightings were detailed in the report, same as previous report
Nov-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with no animals being captured throughout November	A number of fauna sightings were detailed in the report, same as previous report
Oct-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with no animals being captured throughout October	A number of fauna sightings were detailed in the report
Sep-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with no animals being captured throughout September	A number of fauna sightings were detailed in the report
Aug-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued with one	A number of fauna sightings were detailed in the report

		juvenile fox captured and euthanased during August.	
Jul-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued however no animals were captured during July.	A number of fauna sightings were detailed in the report
Jun-16	Could not open report		
May-16	There were no fauna deaths in the RSF for the month.	A program of trapping feral cats and foxes has continued throughout May with a number of cats, *Felis Catus*, captured and euthanased · The program will continue on a monthly basis.	A number of fauna sightings were detailed in the report
Apr-16	There were no fauna deaths in the RSF for the month.	Foxes and hares have been seen on occasion throughout the month · A program of trapping feral cats and foxes has continued throughout April with a single cat captured and euthanized · The program will continue on a monthly basis	A number of fauna sightings were detailed in the report
Mar-16	There were no fauna deaths in the RSF for the month.	Foxes and hares have been seen on occasion throughout the month · A program of trapping feral cats and foxes has continued throughout March with no animals successfully captured. · The program will continue on a monthly basis	A number of fauna sightings were detailed in the report
Feb-16	There were no fauna deaths in the RSF for the month.	· Foxes and hares have been seen on occasion throughout the month · A program of trapping feral cats and foxes has continued throughout February with a single feral cat being captured and taken to veterinarian in Dubbo for euthanasing. · The program will continue on a monthly basis.	A number of fauna sightings were detailed in the report
Jan-16	Could not open report		
Dec-15	There were no fauna deaths in the RSF for the month.	A feral cat trapping program will commence in January	A number of fauna sightings were detailed in the report
Nov-15	There were no fauna deaths in the RSF for the month.	Foxes and hares are seen occasionally.	A number of fauna sightings were detailed in the report
Oct-15	Single fauna death recorded on site access road. No other fauna deaths recorded on site.	Foxes and hares are seen occasionally	A number of fauna sightings were detailed in the report
Sep-15	There were no fauna deaths in the RSF for the month.	Foxes and hares are seen occasionally	A number of fauna sightings were detailed in the report "native animal rescue" section also included in all reports previous to this
Aug-15	There were no fauna deaths in the RSF for the month.	Foxes and hares are seen occasionally	A number of fauna sightings were detailed in the report
Jul-15	There were no fauna deaths in the RSF for the month.	Foxes and hares are seen occasionally	A number of fauna sightings were detailed in the report
Jun-15	An Eastern Grey Kangaroo (sub-adult) Macropus giganteus, suspected vehicle interaction on access road	Foxes were observed during the day on two occasions	A number of fauna sightings were detailed in the report
May-15	The number of fauna deaths during the month was zero	A (sic) foxes and hares observed frequently across the site during the days and nights	A number of fauna sightings were detailed in the report
Apr-15	The number of fauna deaths during the month was two: A Noisy Miner – Vehicle interaction. Australian Magpie –	Not recorded	One sighting (black swan)

	Mired (sic) in RSF		
Mar-15	A Central Bearded Dragon, *Pogona vitticeps*, vehicle interaction	Not recorded	An Inland Broadnosed Bat, *Scotorepens balstoni,* was rescued from stemming pile and released elsewhere on site. Other sightings recorded plus some photos included
Feb-15	The number of fauna deaths during the month was zero	A foxes and hares observed frequently across the site during the days and nights	Inland Carpet Python, *Morelia spilota metcalfei*, was seen twice near the front access road before being shifted off the road to a sheltered location in vegetation area nearby. o Juvenile Crested Pigeon, *Ocyphaps lophotes*, rescued from bunded area within the processing plant.
Jan-15	No native animals required rescue this month.	A foxes and hares observed frequently across the site during the days and nights.	two sightings
Dec-14	A deceased female Teal was found in the vicinity of the RSF and was taken to a local veterinarian for post mortem analysis.	A foxes and hares observed frequently across the site during the days and nights.	A number of fauna sightings were detailed in the report
Nov-14	A Crow with a broken wing was collected from beside the road to the magazine area. It was taken to the local veterinary surgeon and was euthanised	A foxes and hares observed frequently across the site during the days and nights.	A number of fauna sightings were detailed in the report
Oct-14	Could not open report		
Sep-14	No native animals required rescue this month.	A fox observed several times across the site during the days and nights	A number of fauna sightings were detailed in the report
Aug-14	No native animals required rescue this month.	A feral cat was seen near the front access road.	A number of fauna sightings were detailed in the report
Jul-14	Could not open report		
Jun-14	No native animals required rescue this month	A feral cat was seen near the front access road.	A number of fauna sightings were detailed in the report
May-14	Could not open report		
Apr-14	No native animal rescue was required this month	Foxes and Hares were sighted in the paddocks surrounding the mine. · A large cat was observed on the mine site	A number of fauna sightings were detailed in the report
Mar-14	No native animal rescue was required this month.	Foxes and Hares were sighted in the paddocks surrounding the mine	A number of fauna sightings were detailed in the report
Feb-14	Juvenile Eastern Brown Snake, juvenile Bearded Dragon and small skin were collected and removed from an enclosed area in the processing plant. All were in good health and were released elsewhere on site. During the disbanding of a dam on site, two Eel-tailed Catfish and numerous Yabbies were translocated to an alternative dam on site.	Not recorded	A number of fauna sightings were detailed in the report
Jan-14	There were no fauna deaths recorded during January 2014	Approximately 5 Hare sightings (Various across the site) · Two Fox sightings (Primary access road and in the Belah/ Black Oak woodland community component	A number of fauna sightings were detailed in the report

		of the Biodiversity Offset area).	
Dec-13	There were no fauna deaths recorded during December 2013	Not recorded	A number of fauna sightings were detailed in the report
Nov-13	There were no fauna deaths recorded during November 2013.	Not recorded	One eastern rosella One Eastern Rosella was taken to Taronga Western Plains Zoo for hand rearing
Oct-13	There were no fauna deaths recorded during October 2013.	Not recorded	No vegetation clearing was carried out during October 2013
Sep-13	There were no fauna deaths recorded during September 2013.	Not recorded	Trees were felled within the mining footprint areas from 24th to 30th September 2013. An ecologist was present on-site during clearing to monitor for the presence of fauna in the trees to be felled and to relocate any fauna prior to clearing. Approximately 8 nests and 2 hollows were relocated to the nature strips surrounding site. Thirteen birds were taken to Taronga Western Plains Zoo for hand rearing. No other animals were found during the tree clearing.
Aug-13	There were no fauna deaths recorded during August 2013	Not recorded	Identification and relocation of Grey-Crowned Babbler nests along the route of the 66kv power line, was undertaken during August 2013. During tree clearing a fauna spotter was present on site to check for the presence of fauna prior to clearing the vegetation. One central bearded dragon was relocated.
Jul-13	Could not open report		