

SNAPPER MINE

Northern Extension Modification

Appendix A

Biodiversity Assessment

TRONOX 



Snapper Mine Northern Extension Modification

Biodiversity Assessment



for
Tronox Mining Australia Limited

November 2019

Document History

Report	Version	Prepared by	Checked by	Submission Method	Date
Biodiversity Assessment	Issue 1	Andrew Lothian	Nicholas Tong	email	25 Oct 2019
Biodiversity Assessment	Issue 2	Andrew Lothian	Nicholas Tong	email	17 Nov 2019
Biodiversity Assessment	Issue 3	Andrew Lothian	Nicholas Tong	email	19 Nov 2019

Table of Contents

1.0	Introduction	1
1.1	Background.....	1
1.2	Purpose	4
1.3	Existing Environment	8
1.3.1	Regional Location	8
1.3.2	Climate.....	8
1.3.3	Landform and Hydrology.....	9
1.3.4	Land Use	9
2.0	Methods.....	10
2.1	Database and Literature Search.....	10
2.2	Field Surveys	12
2.2.1	Survey Timing.....	12
2.2.2	Vegetation Mapping.....	12
2.2.3	Vegetation Condition (Vegetation Integrity Plots)	13
2.2.4	Survey Techniques – Threatened Flora.....	13
2.2.5	Survey Techniques – Threatened Fauna.....	14
3.0	Weather During the Field Survey.....	25
4.0	Results – Comparison of Disturbance Areas (Study Area 1) and Relinquishment Areas (Study Areas 2 and 3)	26
4.1	Vegetation.....	26
4.2	Threatened Flora Species	35
4.3	Threatened Fauna Species	36
4.3.1	Threatened Frog	40
4.3.2	Threatened Reptile	40
4.3.3	Threatened Birds	41
4.3.4	Threatened Mammal.....	43
5.0	Potential Impacts.....	44
5.1	Vegetation Clearance.....	44
5.2	Weed Incursion.....	44
5.3	Feral Animals.....	44
5.4	Artificial Lighting	44
5.5	Noise.....	44
5.6	Dust.....	45
5.7	Bushfire Risk	45
5.8	Relinquishment Area.....	45
6.0	Impact Assessment – BC Act	46
7.0	Impact Assessment – EPBC Act.....	50
8.0	Conclusion.....	52

9.0	References	54
10.0	Appendices	61
10.1	Appendix A: Threatened Flora and Fauna Previously Recorded in the Wider Locality	61
10.2	Appendix B: Vegetation Integrity Plot Data – Study Area 1	64
10.3	Appendix C: Vegetation Integrity Plot Data – Study Areas 2 and 3	79
10.4	Appendix D: Flora and Fauna Species Located Within the Study Areas.....	91

Tables

Table 1-1:	General Information.....	6
Table 2-1:	Methods Used to Target Threatened Species.....	14
Table 2-2:	Total Fauna Survey Effort.....	16
Table 2-3:	Survey Timing	18
Table 2-4:	Survey of Threatened Species Habitat Constraints.....	20
Table 3-1:	Weather Records from Pooncarie During 2019 Surveys	25
Table 4-1:	PCT Summary for Proposed Surface Disturbance Area – Study Area 1	29
Table 4-2:	Vegetation Integrity Scores – Study Area 1	30
Table 4-3:	PCT Summary for Relinquishment Area – Study Areas 2 and 3	33
Table 4-4:	Vegetation Integrity Scores – Study Areas 2 and 3.....	34
Table 4-5:	Fauna Species Survey Results.....	38
Table 5-1:	Comparison of Vegetation Impacts verse Relinquishment	45
Table 6-1:	Impacts of the Northern Extension Modification on Biodiversity Values	46
Table 10-1:	Threatened Flora and Fauna Previously Recorded in the Wider Locality	61

Figures

Figure 1-1:	Regional Location.....	2
Figure 1-2:	Modified Snapper Mine – Indicative General Arrangement.....	3
Figure 1-3:	Survey Sites	5
Figure 1-4:	Location/Site Map	7
Figure 2-1:	Threatened Species Records	11
Figure 4-1:	Plant Community Types Mapped by BMS.....	28

Plates

Plate 1-1:	Rainfall Deficiency Map for Australia	8
Plate 4-1:	Timber Removal from PCT 221, Study Area 2.....	66

EXECUTIVE SUMMARY

Biodiversity Monitoring Services were commissioned by Tronox Mining Australia Limited (Tronox) to undertake a flora and fauna survey of three areas investigation areas (the study areas) as part of the Snapper Mine Northern Extension Modification Biodiversity Assessment. The study areas are located approximately 85 kilometres (km) north-east of Wentworth and approximately 170 km to the south-east of Broken Hill in western New South Wales (NSW).

The purpose of this document is to report the findings of a review of biodiversity values present in the Study areas and explain why, based on that data, the Northern Extension Modification is not likely to increase impacts on biodiversity values as defined by the NSW *Biodiversity Conservation Act, 2016* (BC Act).

Study areas included two areas (Study Area 1, i.e. the disturbance footprint) to be added to the mine plan (approximately 87.4 hectares [ha]), and two areas (Study Areas 2 and 3) of already approved surface development (approximately 90.7 ha). Tronox wish to forgo surface development in Study Areas 2 and 3 in exchange for approval to develop Study Area 1.

Evidence of only one threatened species listed under the BC Act was located within Study Area 1 during the survey; a feather of the Major Mitchell's Cockatoo (*Cacatua leadbeateri*) in open shrubland. No threatened flora species listed under the BC Act or Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) are known to occur in or around the study areas.

Four Plant Community Types (PCTs) were mapped in Study Area 1. Three PCTs were mapped across Study Areas 2 and 3. A total of 23 Vegetation Integrity plots were conducted in accordance with the Biodiversity Assessment Method.

Mapping of the Study Area 1 shows large areas of shrubland, with smaller areas of derived shrubland and *Black Oak – Western Rosewood open woodland*. Study Areas 2 and 3 comprise mostly *Black Oak – Western Rosewood open woodland* and smaller areas of derived, disturbed or intact shrubland. Most of Study Area 1 is subject to heavy sheep grazing, whereas Study Areas 2 and 3 have remained ungrazed by stock, presumably since commencement of the Snapper Mine. Habitat for several threatened species occurs across all three areas

(hollow-bearing trees and logs), though habitat within Study Areas 2 and 3 is more abundant and of better quality than Study Area 1. Other habitat constraint features, such as waterbodies, native grassland and burrows were absent.

The Northern Extension Modification has been designed to avoid or minimise impacts on native vegetation by predominantly locating the supporting infrastructure in derived shrubland subject to grazing and areas fenced off for mining activity.

In conclusion, the Northern Extension Modification:

- would not increase impacts on biodiversity values as defined by the BC Act and therefore, if the Department of Planning, Industry and Environment is satisfied, a Biodiversity Development Assessment Report is not required; and
- would not increase impacts on threatened species, threatened ecological communities or migratory species listed under the EPBC Act.

Tronox would relinquish (not clear) approximately 90.7 ha of land within the approved Snapper Mine Project area. This would result in a net positive outcome for biodiversity values in the local area.

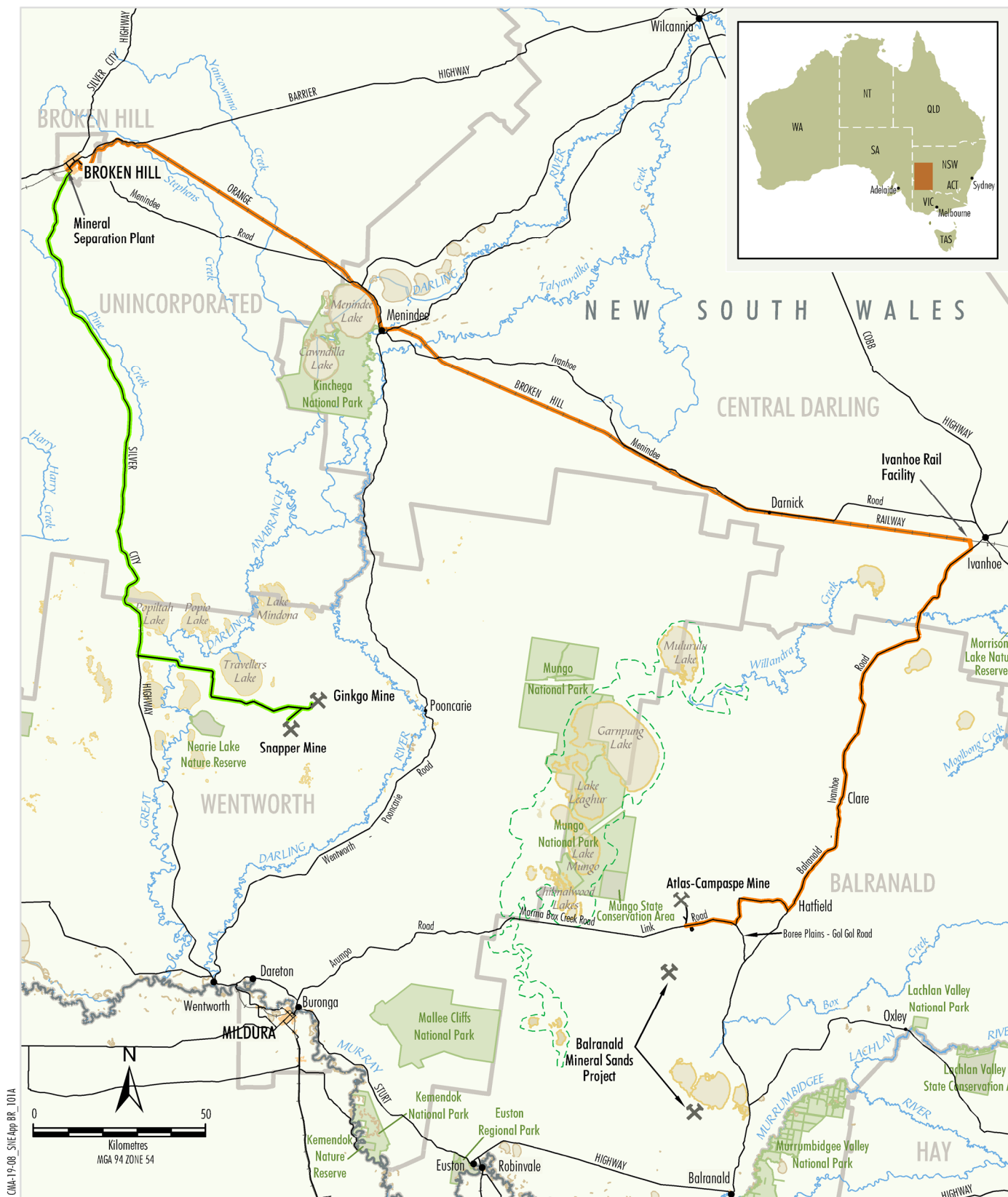
1.0 INTRODUCTION

1.1 BACKGROUND

Tronox Mining Australia Limited (Tronox) proposes to extend the existing/approved mine path at the Snapper Mine to maintain continuity of production and associated employment of the Snapper Mine workforce until the commencement of operations at the Atlas-Campaspe Mine and will seek a modification of Project Approval (06_0168) under Section 4.55 of the *Environmental Planning and Assessment Act, 1979* (herein referred to as the Northern Extension Modification). The Northern Extension Modification is located approximately 85 kilometres (km) north-east of Wentworth and approximately 170 km south-east of Broken Hill in western New South Wales (NSW) (**Figure I-1**).

The Northern Extension Modification would include (**Figure I-2**):

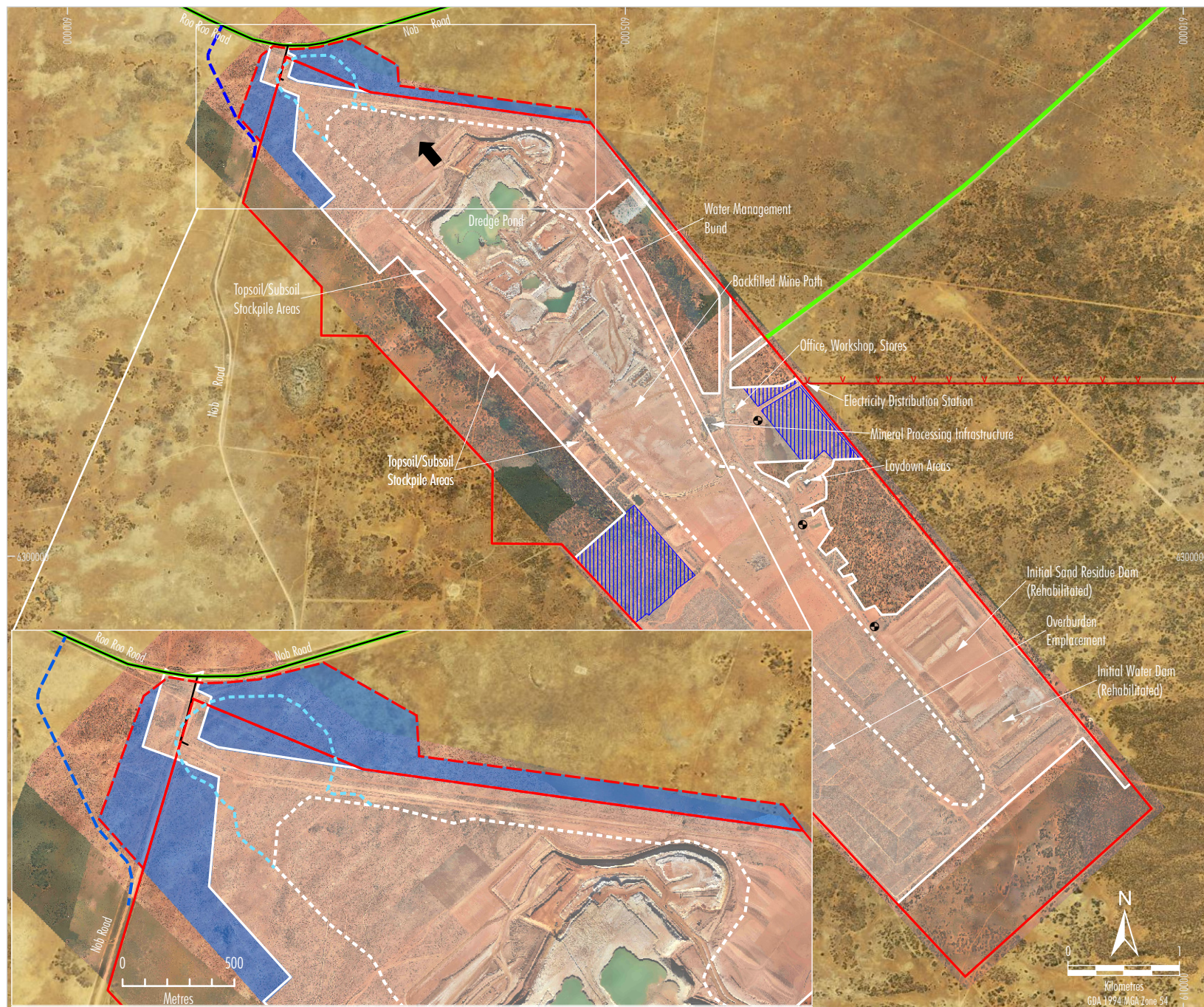
- extension of the existing/approved mine path and associated supporting infrastructure into Mining Lease Application (MLA) I;
- development of temporary off-path overburden emplacements;
- additional soil stockpile areas;
- re-alignment of Nob Road around MLA I;
- reduction in the number of final depressions from two to one;
- increased size of the remaining final depression;
- relinquishment of approved surface development areas no longer required, resulting in a net reduction in surface development area; and
- no change to other approved mine components – production rate, mining method, processing operations, road transport, employment, etc.



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S N A P P E R M I N E
Regional Location

* MSP Process Waste Transport Route following cessation of operations at the Ginkgo and Snapper Mines.

Figure 1-1



- LEGEND**
- Approved Project**
- Mining Lease Boundary (ML 1621)
 - Existing/Approved Surface Development Extent
 - Mine Path Extent
 - Direction of Mining
 - Water Supply Bore
 - Mineral Concentrate Transport Route and MSP Process Waste Transport Route
 - Highway Access Road
 - Electricity Transmission Line
- Modified Project**
- Mining Lease Application Boundary (MLA 1)
 - Approved Surface Development Areas to be Relinquished
 - Additional Surface Development Extent
 - Additional Mine Path Extent
 - Realigned Road

Source: NSW Spatial Services (2019); Tronox (2019)
Orthophoto: Tronox (2019)

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S N A P P E R M I N E

**Modified Snapper Mine -
Indicative General Arrangement**

Figure 1-2

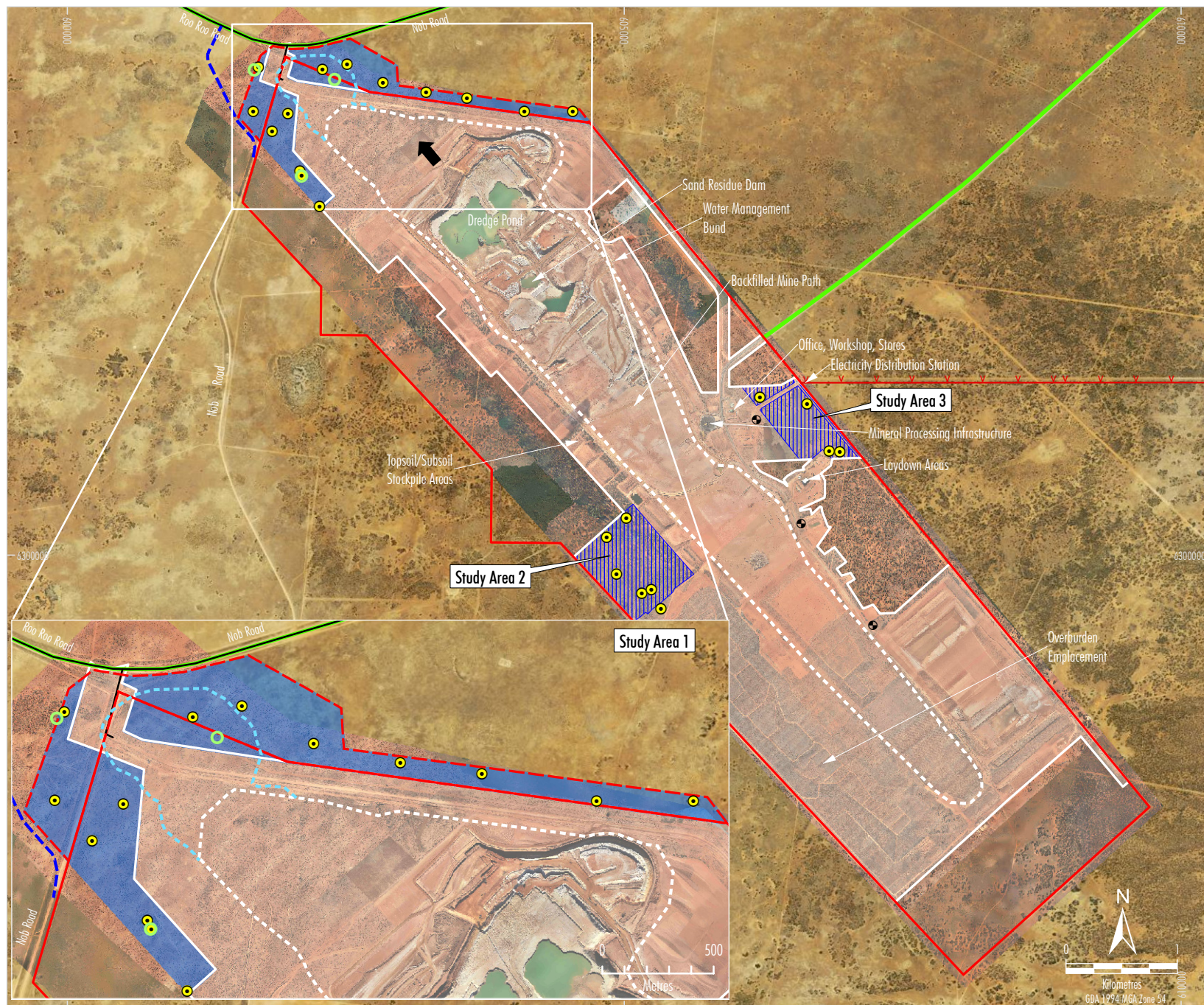
1.2 PURPOSE

Biodiversity Monitoring Services (BMS) was commissioned by Tronox to undertake a vegetation condition assessment, target flora surveys and target fauna surveys across three study areas (Study Areas 1, 2 and 3). Surveys were conducted in accordance with the Biodiversity Assessment Method (BAM). Survey site locations and Vegetation Integrity (VI) plots are shown on **Figure I-3**.

The study areas include:

- Study Area 1: Approximately 87.4 hectares (ha), located to the northwest of the existing Snapper Mine, between the Snapper Mine and Nob Road;
- Study Area 2: Approximately 57 ha, located to the southwest of the existing Snapper Mine, between the Snapper Mine and the existing Snapper Mine Biodiversity Offset Area; and
- Study Area 3: Approximately 33.7 ha, located to the northeast of the existing Snapper Mine, between the Snapper Mine and the access road to Snapper Mine from Nob Road.

Tronox wish to seek approval for additional clearance within Study Area 1 but also relinquish previously approved clearance in Study Areas 2 and 3 (**Figure I-3**). The purpose of this document is to report the findings of a review of biodiversity values present and aims to demonstrate to the Department of Planning, Industry and Environment (DPIE) that the Northern Extension Modification (including the proposed development and relinquishment) would not increase impacts on biodiversity values as defined by the NSW *Biodiversity Conservation Act, 2016* (BC Act). This report has been prepared in accordance with the requirements of section 30A(2)(c) of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*.



- LEGEND**
- Approved Project**
- Mining Lease Boundary (ML 1621)
 - Existing/Approved Surface Development Extent
 - Mine Path Extent
 - Direction of Mining
 - Water Supply Bore
 - Mineral Concentrate Transport Route and MSP Process Waste Transport Route
 - Highway Access Road
 - Electricity Transmission Line
- Modified Project**
- Mining Lease Application Boundary (MLA 1)
 - Approved Surface Development Areas to be Relinquished
 - Additional Surface Development Extent
 - Additional Mine Path Extent
 - Realigned Road
 - Vegetation Integrity Plots
 - Pitfall Trap

Source: NSW Spatial Services (2019); Tronox (2019)
 Orthophoto: Tronox (2019)

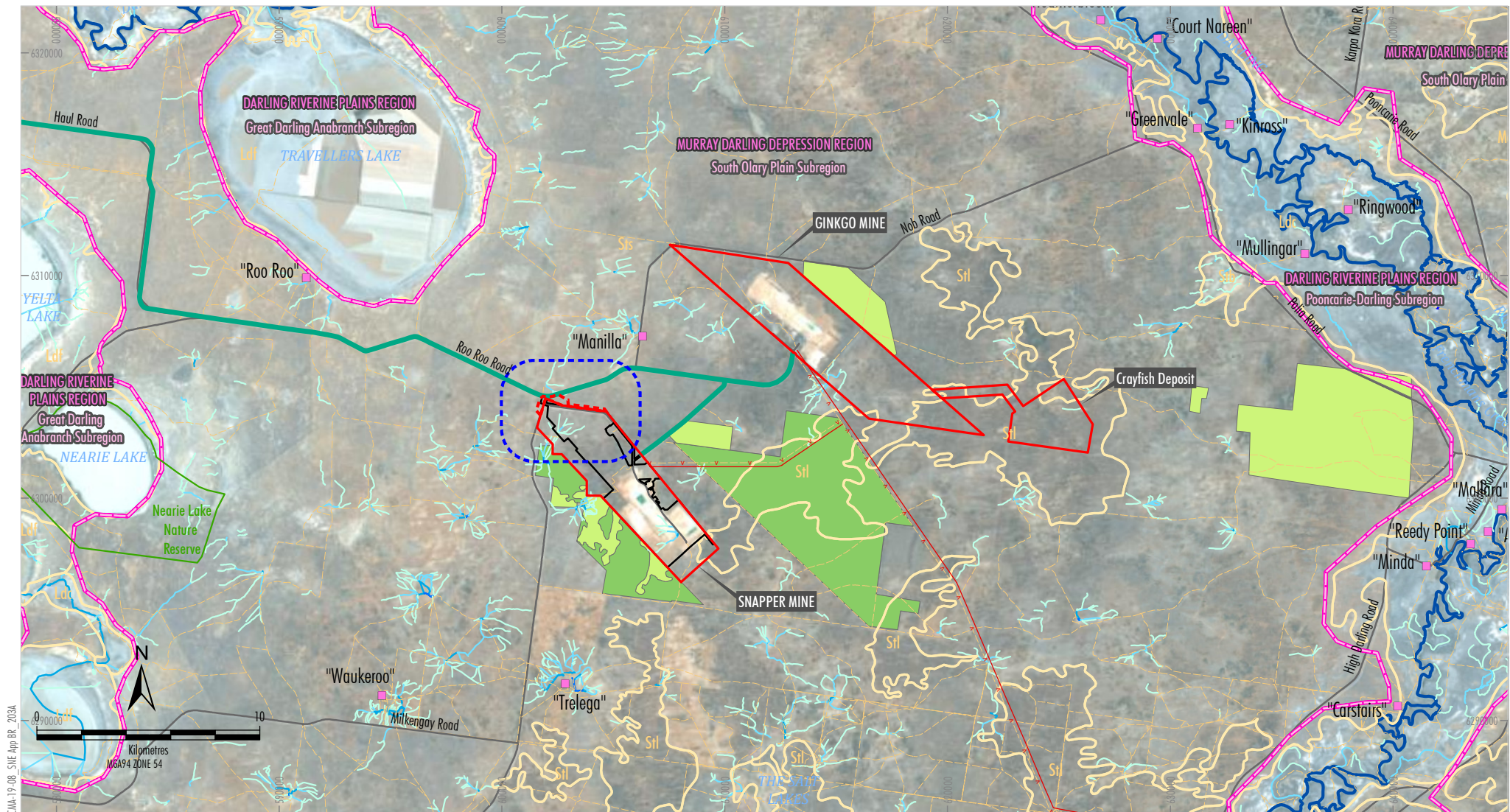
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 SNAPPER MINE
 Survey Sites

Figure 1-3

Table I-1 presents a summary of information requirements in accordance with the NSW Department of Planning and Environment (DP&E) (2018).

Table I-1: General Information

Information Required	Details
Admin	
Proponent	Tronox Mining Australia Limited
Contact Details	Haakon Nielssen, 381 Benetook Avenue, Mildura VIC 3500. 03 5025 4600.
Project ID	Snapper Mine Northern Extension Modification
Author	Andrew Lothian BComm/BSc (Hons. Ecology) BAAS18110 Biodiversity Monitoring Services
Site Details	
Street Address	Nob Road, Pooncarie.
Lot and DP	Lot and DP: 1926, 763904 / 1927, 763905.
Local Government Area	Wentworth Local Government Area.
Description of Existing Development Site	The Northern Extension Modification would involve relinquishment of approved disturbance in Study Areas 2 and 3 for the extension of the approved mine path and supporting infrastructure into a new ML within Study Area 1.
Location	See Figures I-1 and I-4 .
Site Map	See Figure I-4 .
Proposed Development	
Description	See Section I.1.
Site Plan	See Figure I-2 .



CMA-19-05_SNE App BR_203A

Source: NSW Spatial Services (2019); Tronox (2019)



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S N A P P E R M I N E

Location/Site Map

Figure 1-4

1.3 EXISTING ENVIRONMENT

1.3.1 REGIONAL LOCATION

The study areas are located in the Murray Darling Depression Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and the South Olary Plain IBRA sub-region (DEE, 2019a) (**Figure I-4**). The study areas are also within the Western Local Land Service Region.

1.3.2 CLIMATE

The closest Bureau of Meteorology (BOM) weather stations to the study areas are located approximately 30 km east at Pooncarie Mail Agency and 90 km south-southwest at Wentworth Post Office. The mean annual rainfall near the study area is between 268 millimetres (mm) (Pooncarie) and 287 mm (Wentworth) (BOM, 2019). **Plate I-1** shows that there has been severe rainfall deficiency for the region between October 2016 and September 2019.

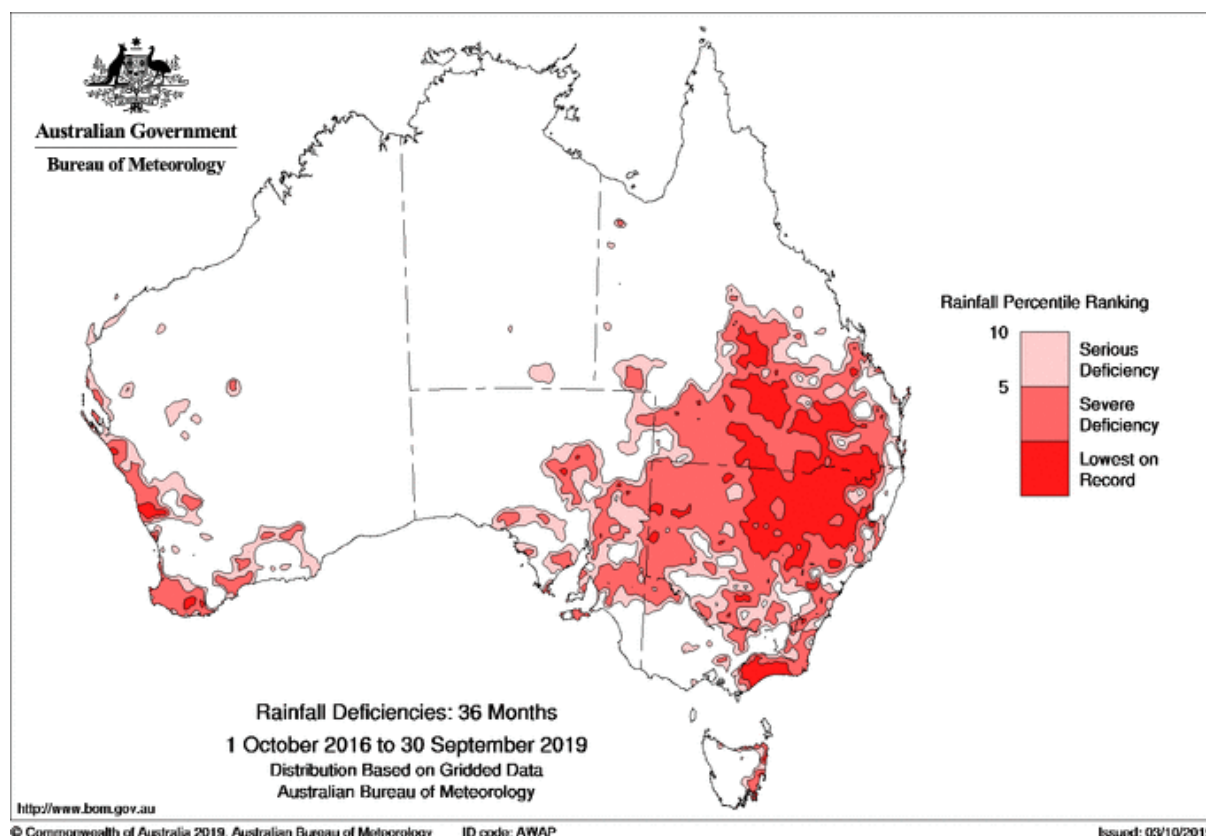


Plate I-1: Rainfall Deficiency Map for Australia

1.3.3 LANDFORM AND HYDROLOGY

Topography of the surrounding region shows limited relief and comprises generally flat to undulating land covered by a combination of grassland, shrubland and low woodland. Elevation within the study areas range from 60 to 80 metres (m) Australian Height Datum.

The study area does not contain any watercourses or artificial watering points.

1.3.4 LAND USE

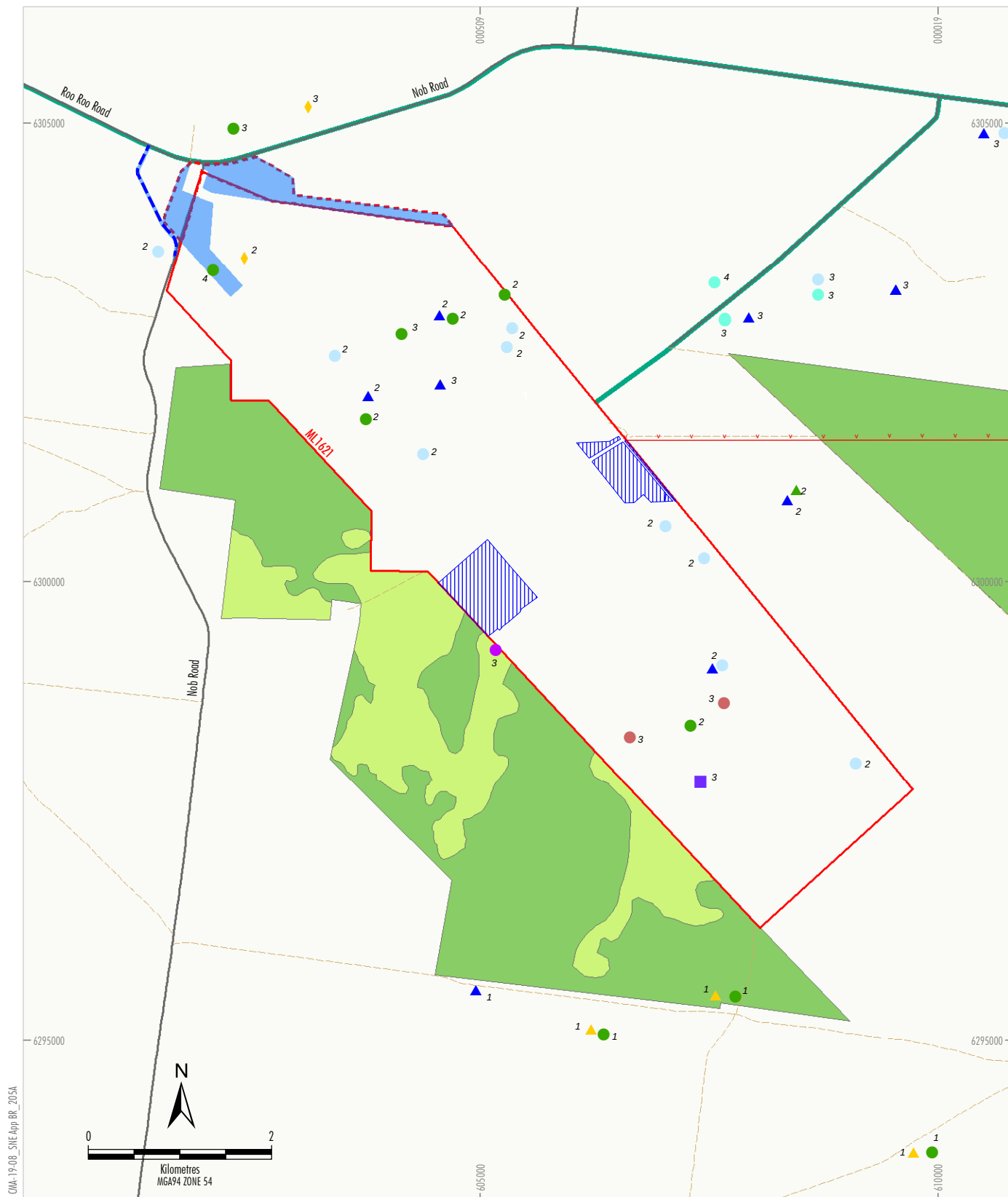
Surrounding land uses (outside of the mining lease) comprise of pastoral leasehold lands that are used predominantly for livestock grazing of native pastures by sheep (*Ovis aries*), cattle (*Bos taurus*) and goats (*Capra hircus*) on Perpetual Western Land Leases. There is an existing Snapper Mine offset located immediately to the southwest of Study Area 2. A small portion of Study Area 1, and all of Study Areas 2 and 3 have had stock excluded for some time, though goats and kangaroos (*Macropus* sp.) still have access for grazing. These areas contain less biological soil crust disturbance than the portions of Study Area 1 that are grazed more intensively by sheep. One-way gates and goat ramps have been installed on the mining lease boundary fence.

2.0 METHODS

A combination of desktop searches, habitat assessment and physical surveys were used to determine the potential presence of threatened flora and fauna species in the study areas.

2.1 DATABASE AND LITERATURE SEARCH

Threatened species previously recorded in the wider locality are summarised in **Appendix A**. Threatened species recorded in the vicinity of Snapper Mine are shown on **Figure 2-1**.



LEGEND

- Mining Lease Boundary (ML)
- - - Mining Lease Application Boundary (MLA 1)
- Mineral Concentrate Transport Route and MSP Process
- - - Waste Transport Route
- - - Electricity Transmission Line
- - - Realigned Road
- ▨ Approved Surface Development Areas to be Relinquished
- ▨ Additional Surface Development Extent
- ▨ Existing Snapper Mine - Biodiversity Offset Area
- ▨ Existing Ginkgo Mine - Southern Mallee Offset Area

Threatened Species

- | | | |
|---|--|---|
| Reptile | Bird | Mammal |
| ◆ Western Blue-tongued Lizard | ● Hooded Robin (south-eastern form) | ■ Stripe-faced Dunnart |
| ● Little Eagle | ● Major Mitchell's Cockatoo | ▲ Inland Forest Bat |
| ● Spotted Harrier | ● Varied Sittella | ▲ Little Pied Bat |
| | | ▲ Yellow-bellied Sheath-tail-bat |

Source: (1) Western Research Institute (2007)
 (2) Western Research Institute and Resource Strategies Pty (2007)
 (3) DPIE (2019)
 (4) Biodiversity Monitoring Services (2019)

Source: NSW Spatial Services (2019); Tronox (2019)

TRONOX

S N A P P E R M I N E
Threatened Species Records

Figure 2-1

2.2 FIELD SURVEYS

VI plots and surveys were undertaken within the study areas for the proposed Northern Extension Modification (**Figure I-3**). The surveys included targeted flora and fauna surveys and habitat assessment for threatened species listed under the BC Act and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) with potential to occur in Study Area 1. Any threatened species found likely to be present in Study Area 1 were then to be surveyed for in Study Areas 2 and 3. VI plots were also conducted in Study Areas 2 and 3 to allow comparison of biodiversity value with Study Area 1 using BAM metrics.

2.2.1 SURVEY TIMING

The study area was visited between the 1st and 10th October 2019 to conduct targeted flora and fauna surveys and habitat assessments. The study area was surveyed by Andrew Lothian and Nicholas Tong using National Parks and Wildlife Service Scientific Licence No. SLI01725 and Department of Primary Industry's Animal Research Authority No. TRIM 16/559.

2.2.2 VEGETATION MAPPING

VI plots were conducted in obviously different areas on the subject land. From this, dominant species in each strata and landscape position were used to identify the most likely Plant Community Type (PCT) match. PCT boundaries on the subject land were then mapped by traversing ecotones over the whole site.

Derived PCTs exist on site. Since the ground strata for all the PCTs identified are essentially the same, sometimes consisting of different dominance ratios of shrub species, derived woodland PCTs (presenting as shrubland with no tree species) were identified by the presence of coarse woody debris on the ground. Shrubland without coarse woody debris was considered to be non-derived. The two bluebush shrubland PCTs were separated based on the dominance of either species (Pearl and Black Bluebush). Interestingly the regional mapping was almost the inverse of what was on the ground, with regionally mapped Pearl Bluebush Shrubland often containing a monoculture of Black Bluebush.

Vegetation zones within PCTs were identified according to disturbance history. Derived woodland was obviously in a different condition state to intact woodland as they lacked any standing tree species. Most of the land in the region would have been historically grazed, so it may not make any sense to stratify the area based on grazing history. However, the portion of Study Area 1 within the mining lease fence has had sheep/stock grazing excluded for a number of years (as evidenced by the presence of a biological soil crust and fewer stock pathways). There are still goats and kangaroos grazing the area, but not to the extent that it is happening outside the mine fence. There were obvious condition state differences associated with roads, tracks and fencelines. The main roads had no vegetation and were excluded from assessment as native vegetation. Minor tracks and tracks down fencelines often exhibited *Sclerolaena* and weed regrowth.

2.2.3 VEGETATION CONDITION (VEGETATION INTEGRITY PLOTS)

Vegetation integrity was assessed in accordance with Section 5.3 of the BAM (OEH, 2017). After Study Area 1 was stratified into different PCTs, the minimum number of VI plots required for each PCT was calculated using Table 4 of the BAM (OEH, 2017). Due to time constraints, vegetation zones of the same PCT across Study Areas 2 and 3 were pooled and a minimum number of plots surveyed for each PCT only. It is likely that to satisfy the BAM additional plots would be required for the different vegetation condition zones. Instead, VI plots in the *Black Oak – Western Rosewood open woodland* PCT were conducted in patches that were representative of the proportion of each condition state present on the ground; i.e. for the five plots required, one was conducted in a disturbed zone, one in a derived zone, and three in intact areas. If derived state *Black Oak – Western Rosewood open woodland* was approximately 20 percent (%) of that PCT across Study Areas 2 and 3, one VI plot was conducted.

2.2.4 SURVEY TECHNIQUES – THREATENED FLORA

The flora survey methodology follows that specified in the *NSW Guide to Surveying Threatened Plants* (OEH, 2016). A candidate list of threatened plant species was derived by identifying those associated with the PCTs in Study Area 1, and assessing the microhabitat suitability of the site for each species (**Table 2-1**). There were very few threatened plant species records from the surrounding area, with only an unidentified *Swainsona* species being recorded

proximal to site during previous surveys (**Appendix A**). Though the timing of the survey was in accordance with the *Threatened Biodiversity Data Collection*, the area is experiencing prolonged drought. As such, survey conditions were suboptimal. Parallel field traverses were conducted across Study Area I, searching for threatened plants identified as having potential habitat on site. Ten (10) m traverses were used as three of the four species we were looking for were in the Herb and Forb life form category (see Tables 1 to 3 of OEH, 2016). Due to timing constraints, only approximately 50% of Study Area I was traversed. This constituted approximately 50 km of traverses and 12.5 person-hours.

2.2.5 SURVEY TECHNIQUES – THREATENED FAUNA

The fauna survey methodology follows that specified in the draft working guidelines produced by the Department of Environment and Conservation (DEC) (2004). Methodologies for each fauna type are summarised in **Table 2-1** and a summary of the survey effort in each survey period is given in **Table 2-2**.

Table 2-1: Methods Used to Target Threatened Species

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Targeted survey methodology
		BC Act ¹	EPBC Act ²		
Plants					
<i>Acacia carneorum</i>	Purple-wood Wattle	V	V	Species	Threatened flora survey – 10 m traverses
<i>Atriplex infrequens</i>	A saltbush	V	V	Species	Habitat assessment. Not targeted due to lack of suitable habitat.
<i>Austrostipa nullanulla</i>	A spear-grass	E	-	Species	Habitat assessment. Not targeted due to lack of suitable location.
<i>Brachyscome papillosa</i>	Mossgiel Daisy	V	V	Species	Threatened flora survey – 10 m traverses
<i>Calotis moorei</i>	A burr-daisy	E	E	Species	Threatened flora survey – 10 m traverses

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Targeted survey methodology
		BC Act ¹	EPBC Act ²		
<i>Cratystylis conocephala</i>	Bluebush Daisy	E	-	Species	Threatened flora survey – 10 m traverses
<i>Kippistia suaedifolia</i>	Fleshy Minuria	E	-	Species	Habitat assessment. Not targeted due to lack of suitable habitat.
Amphibians					
<i>Neobatrachus pictus</i>	Painted Burrowing Frog	E	-	Species	Habitat assessment. Not targeted. Previous consultation from expert suggests original sighting from locality may be erroneous (Biosphere Environmental Consultants, 2007).
Reptiles					
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	-	Species	Pitfall trapping, reptile funnels, spotlighting.
Birds					
<i>Ardeotis australis</i>	Australian Bustard	E	-	Species	Bird survey.
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	Species	Bird survey, call playback, spotlighting.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	Species/Ecosystem	Bird survey, nest tree survey.
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	-	Species/Ecosystem	Bird survey, nest tree survey.
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Species/Ecosystem	Bird survey, nest tree survey.
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V	-	Species/Ecosystem	Bird survey, nest tree survey.
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Species/Ecosystem	Bird survey, nest tree survey.
<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot (eastern subspecies)	E	V	Species/Ecosystem	Habitat assessment. Not targeted due to lack of suitable location.

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Targeted survey methodology
		BC Act ¹	EPBC Act ²		
Mammals					
<i>Lasiorhinus latifrons</i>	Southern Hairy-nosed Wombat	E	-	Species	Burrow searches.

Note: Species highlighted are those surveyed by BMS.

¹ Conservation status under the BC Act (current as at November 2019). E = Endangered, V = Vulnerable.

² Conservation status under the EPBC Act (current as at November 2019). E = Endangered, V = Vulnerable.

³ Biodiversity credit class under the *Threatened Biodiversity Data Collection* (DPIE, 2019b) (current as at November 2019).

Table 2-2: Total Fauna Survey Effort

Survey technique	Survey effort
Diurnal Bird Survey	30 (30 minutes each)
Call Playback	1
Hand Spotlighting	1 (2 person-hours total)
Diurnal Habitat Traverses	11 (50 km total)
Pitfall and Reptile Funnel Trapping	3 x 30 m lines consisting each of three pits and four reptile funnels, deployed for nine nights

Bird Surveys

DEC (2004) recommend a total of three 60-minute surveys to sample approximately 90% of the species present in an area. Bird surveys were conducted at the three pitfall locations in Study Area 1 each morning over nine days (**Figure 1-3**). Opportunistic records of bird species were made during PCT mapping, VI plot surveys, threatened flora traverses and general driving around site. This incorporated a mix of morning and afternoon survey periods to account for temporal changes in species' use of the study areas. Species targeted during these surveys include Australian Bustard (*Ardeotis australis*), Bush Stone-curlew (*Burhinus grallarius*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Black-breasted Buzzard (*Hamirostra melanosternon*), Little Eagle (*Hieraaetus morphnoides*), Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) and Square-tailed Kite (*Lophoictinia isura*). The small amount of coarse woody debris was searched to flush Bush Stone-curlews during PCT mapping and flora traverses of

Study Area 1. Habitat assessment focused on characteristics of the habitat that would be suitable for the species concerned (hollow bearing trees, coarse woody debris, stick nests, waterbodies, etc).

These surveys aimed to pick up any of the threatened species associated with PCTs 58, 143, 153 and 154 in the Murray Darling Depression IBRA region and South Olary Plain subregion during the required survey month (DPIE, 2019b) (**Table 2-3**).

Habitat Assessment

To assess the suitability of the habitat in Study Area 1 for each of the potential target Species Credit Species, assessment of habitat attributes was conducted (**Table 2-4**). October surveys involved assessment of habitat characteristics that would potentially make the development footprint suitable for threatened species, particularly the species that could not be surveyed for in the time constraints (i.e. *Atriplex infrequens*).

Notes were made on the following attributes:

- Presence of existing raptor nests;
- Presence and size of hollows;
- Presence of feed/prey species;
- Presence of fallen timber; and
- Proximity to dams/watercourse/waterbodies.

Table 2-3: Survey Timing

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Survey Months for Each Species (DPIE, 2019b)											
		BC Act ¹	EPBC Act ²		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Plants																
<i>Acacia carneorum</i>	Purple-wood Wattle	V	V	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Atriplex infrequens</i>	A saltbush*	V	V	Species	Yes	Yes	-	-	-	-	-	-	-	-	Yes	Yes
<i>Brachyscome papillosa</i>	Mossgiel Daisy	V	V	Species	-	-	-	-	-	-	-	-	-	Yes	Yes	Yes
<i>Calotis moorei</i>	A burr-daisy	E	E	Species	-	-	-	-	-	-	-	-	-	Yes	Yes	Yes
<i>Cratystylis conocephala</i>	Bluebush Daisy	E	-	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Kippistia suaedifolia</i>	Fleshy Minuria*	E	-	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Amphibians																
<i>Neobatrachus pictus</i>	Painted Burrowing Frog	E	-	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reptiles																
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	-	Species	Yes	Yes	Yes	-	-	-	-	-	-	Yes	Yes	Yes
Birds																
<i>Ardeotis australis</i>	Australian Bustard	E	-	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Survey Months for Each Species (DPIE, 2019b)											
		BC Act ¹	EPBC Act ²		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	Species/Ecosystem	-	-	-	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	-	Species/Ecosystem	-	-	-	-	-	-	-	-	Yes	Yes	Yes	-
<i>Hieraetus morphnoides</i>	Little Eagle	V	-	Species/Ecosystem	-	-	-	-	-	-	-	Yes	Yes	Yes	-	-
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V	-	Species/Ecosystem	-	-	-	-	-	-	-	-	Yes	Yes	Yes	Yes
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Species/Ecosystem	Yes	-	-	-	-	-	-	-	Yes	Yes	Yes	Yes
Mammals																
<i>Lasiorhinus latifrons</i>	Southern Hairy-nosed Wombat	E	-	Species	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Species highlighted are those surveyed by BMS.

¹ Conservation status under the BC Act (current as at November 2019). CE = Critically Endangered, E = Endangered, V = Vulnerable.

² Conservation status under the EPBC Act (current as at November 2019). CE = Critically Endangered, E = Endangered, V = Vulnerable.

³ Biodiversity credit class under the *Threatened Biodiversity Data Collection* (DPIE, 2019b) (current as at November 2019).

* This species was not surveyed for due to the habitat constraint (**Table 2-4**).

Table 2-4: Survey of Threatened Species Habitat Constraints

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Habitat Constraints identified in the <i>Threatened Biodiversity Data Collection</i> (DPIE, 2019b)	Field Assessment of Habitat Constraints
		BC Act ¹	EPBC Act ²			
Plants						
<i>Acacia carneorum</i>	Purple-wood Wattle	V	V	Species	None	N/A
<i>Atriplex infrequens</i>	A saltbush	V	V	Species	None	Need fruiting bodies to identify, which only occur Nov-Feb, 4-6 weeks after above average rainfall. Unlikely to be fruiting under current conditions.
<i>Austrostipa nullanulla</i>	A spear-grass	E	-	Species	<i>Land containing gypseous lunettes and copi rises.</i> <i>Geographic constraint: Within 50km of Murray River (DPIE, 2019c).</i>	No gypseous lunettes or copi rises within Study Area I. Currently known only in NSW from Nulla Station to the north of Lake Victoria (west of Wentworth). Not within 50 km of Murray River, so excluded due to geographic constraints. Flowers Sep-Dec, 4-6 weeks after significant rain. Unlikely to be flowering under current conditions.
<i>Brachyscome papillosa</i>	Mossgiel Daisy	V	V	Species	None	N/A
<i>Calotis moorei</i>	A burr-daisy	E	E	Species	None	N/A
<i>Cratystylis conocephala</i>	Bluebush Daisy	E	-	Species	None	N/A
<i>Kippistia suaedifolia</i>	Fleshy Minuria	E	-	Species	<i>Saline lakes, depressions and claypans with Gypseous or calcareous soils, gypseous dunes, or within 50 m.</i>	No waterbodies, dunes, saline lakes, depressions or claypans within Study Area I. Excluded based on habitat constraints.

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Habitat Constraints identified in the <i>Threatened Biodiversity Data Collection</i> (DPIE, 2019b)	Field Assessment of Habitat Constraints
		BC Act ¹	EPBC Act ²			
Amphibians						
<i>Neobatrachus pictus</i>	Painted Burrowing Frog	E	-	Species	None	N/A Previous expert advice has suggested the original ID may be erroneous so species unlikely to inhabit location.
Reptiles						
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	-	Species	None	N/A
Birds						
<i>Ardeotis australis</i>	Australian Bustard	E	-	Species	None	N/A
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	Species	Fallen/standing dead timber including logs.	Survey for fallen/standing dead timber, including logs.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	Species/Ecosystem	Breeding constraint: Other (Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines).	Survey for living or dead mature trees that could provide breeding habitat within 1 km of large waterbodies and major watercourses.
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	-	Species/Ecosystem	Breeding constraint: Waterbodies (Land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts).	Survey for dead/dying mature trees that could provide breeding habitat within 40 m of riparian vegetation associated with waterbodies or watercourses.
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Species/Ecosystem	Breeding constraint: Other (Nest trees – live [occasionally dead] large old trees within vegetation).	Survey for live and dead nest trees and large trees with vegetation that could provide breeding habitat.
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V	-	Species/Ecosystem	Breeding constraint: Hollow bearing trees (Living or dead tree with hollows greater than 10 cm diameter).	Survey for trees with hollows greater than 10 cm diameter, that could provide breeding habitat.

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Habitat Constraints identified in the <i>Threatened Biodiversity Data Collection</i> (DPIE, 2019b)	Field Assessment of Habitat Constraints
		BC Act ¹	EPBC Act ²			
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Species/Ecosystem	Breeding constraint: Other (Nest trees).	Survey for nest trees that could provide breeding habitat.
<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot (eastern subspecies)	E	V	Species/Ecosystem	Breeding constraint: Hollow bearing trees (Living or dead <i>E. camaldulensis</i> with hollows greater than 5 cm diameter, greater than 5 m above the ground OR trees with diameter at breast height [DBH] of greater than 40 cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee). Geographic constraint: Within 20 km of Murray and Murrumbidgee Rivers, within 30 km of Murray River.	Survey for <i>E. camaldulensis</i> trees with hollows greater than 5 cm diameter, greater than 5 m above ground, OR trees with DBH > 40 cm, within 1 km of watercourses/waterbodies that could provide breeding habitat. Not within 30 km of Murray River, so excluded due to geographic constraints.
Mammals						
<i>Lasiorhinus latifrons</i>	Southern Hairy-nosed Wombat	E	-	Species	None	Search for presence of burrow systems, adding a 2 km buffer.

Note: Species highlighted are those surveyed by BMS.

¹ Conservation status under the BC Act (current as at November 2019). CE = Critically Endangered, E = Endangered, V = Vulnerable.

² Conservation status under the EPBC Act (current as at November 2019). CE = Critically Endangered, E = Endangered, V = Vulnerable.

³ Biodiversity credit class under the *Threatened Biodiversity Data Collection* (DPIE, 2019b) (current as at November 2019).

Pitfall Trapping/Reptile Funnels

Reptiles were surveyed for by pitfall line over nine nights in Study Area I. Trap locations were stratified by PCT. One line was erected in the *Narrow-leaved Hopbush – Scrub Turpentine – Senna shrubland* (PCT 143), one in the *Black Bluebush low open shrubland* containing a patch of Black Oak (PCT 153) and one in *Pearl Bluebush low open shrubland* (PCT 154) (**Figure I-3**). Each trapline consisted of 30 m of mesh drift fence, with three pitfalls (150 mm diameter pipe, 60 cm deep) and four reptile funnels placed at even spaces along the fence. Pit lines were checked each morning, or twice daily on the two hotter days in the middle of the trapping period. Captures were identified to species.

Call Playback

Nocturnal birds were surveyed for by call playback over one night in Study Area I. Calls of Bush Stone-curlew were played from a megaphone in the only part of Study Area I containing trees and coarse woody debris (PCT 58). An initial listening period of 10 minutes was undertaken, followed by a quick spotlight of the immediate area. The call was played for a period of 30 seconds followed by a 5 minute listen period. This was repeated four times. Surveys were conducted within 2 hours of sunset.

Spotlighting

Nocturnal birds and reptiles were surveyed for by spotlighting in Study Area I, after the completion of call playbacks. This involved traversing parts of Study Area I containing coarse woody debris (PCT 58) with a hand-held 30-Watt spotlight, searching all trees, shrubs and coarse woody debris within the study area. One one-hour, two-person spotlight survey was conducted over a single warm night. Each walked transect covered approximately 1 km.

Due to the scarcity of trees or potential habitat features in Study Area I, a single night spotlighting was considered sufficient. Furthermore, areas containing habitat constraint for Bush Stone-curlew were also searched by day during threatened flora searches.

Searches

Whilst conducting habitat assessment, PCT mapping, threatened flora searches, and VI plots in Study Areas 1 to 3, additional signs of animal use were noted. This involved searches for scats, burrows, water bodies, raptor nests/perches and potential hollows.

3.0 WEATHER DURING THE FIELD SURVEY

Data from weather station at Pooncarie Mail Agency, NSW (Australian Bureau of Meteorology 2019) is given in **Table 3-1**.

Table 3-1: Weather Records from Pooncarie During 2019 Surveys

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
28/09/2019	4.8	22.8	0
29/09/2019	5.6	-	0
30/09/2019	6.1	23.2	0
01/10/2019	4.2	28.0	0
02/10/2019	6.8	33.0	0
03/10/2019	13.4	32.0	0
04/10/2019	11.0	32.7	0
05/10/2019	17.5	39.2	0
06/10/2019	24.2	33.5	0
07/10/2019	12.7	23.8	0
08/10/2019	10.7	20.0	0
09/10/2019	6.0	22.8	0
10/10/2019	6.8	23.4	0
11/10/2019	6.2	24.6	0

Maximum temperatures were almost one degree Celsius (°C) above average for October in Pooncarie, but minimum temperatures were approximately equal to the long-term average.

Rainfall this October was well below the long-term average of 24.7 mm, with only 0.2 mm of rain falling. A similar story was seen in September with only a quarter of the long-term average rainfall.

Moon phase during the October surveys was waxing from new moon at the beginning of the period to full moon at the end. Conditions during spotlighting and call playback were warm with no wind.

4.0 RESULTS – COMPARISON OF DISTURBANCE AREAS (STUDY AREA 1) AND RELINQUISHMENT AREAS (STUDY AREAS 2 AND 3)

4.1 VEGETATION

Previous vegetation mapping (FloraSearch, 2007) was not done to PCT level and shows Study Area 1 mapped as *Austrostipa Grassland*. Study Areas 2 and 3 were previously mapped as mixes of *Black Oak – Rosewood – Wilga Woodland* and *Bluebush Shrubland* (FloraSearch, 2007). Historical mapping of the vegetation communities was likely conducted over a much larger geographic area, at a coarser scale, with superseded vegetation community descriptions. The BC Act now requires description of vegetation by PCTs. Designation of PCTs were conducted by traverses of all three study areas, using plant species identifications made during VI plots. These are mapped in **Figure 4-1**.

Study Area 1 consists primarily of native shrub vegetation. A number of exotic (and one high threat exotic) forb species were also present in the ground layer. The eastern portion of the study area was subject to high density grazing with sheep in the paddock at the time of survey. The western portion of Study Area 1, west of Nob Road, was also subject to current grazing, though not quite to the same extent. The portion of the western study area to the east of Nob Road looks to have had grazing excluded for some time as it is fenced off for mining activity. There are still small numbers of goats and kangaroos grazing all three sections. Sections of Study Area 1 mapped as woodland were all present as derived shrubland, with extensive remnant coarse woody debris delineating the natural from derived shrubland.

Study Area 1 contained the following four PCTs:

- PCT 58: *Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion*. Present as isolated clumps of low open Black Oak woodland or derived shrubland. Sparse shrub and ground layer. Occurring on undulating sandplains with red-brown sandy soil. Low tree cover is due to historical clearing or dieback associated with sheep grazing.

- PCT 143: *Narrow-leaved Hopbush – Scrub Turpentine – Senna shrubland on semi-arid and arid sandplains and dunes.* Present as tall open shrubland dominated by Narrow-leaved Hopbush. Ground layer of sclerolaena and bluebush. Occuring on low red-brown sandy rise with deeper soil. Due to the lack of coarse woody debris it is considered a natural community, even though the paddock is subject to grazing.
- PCT 153: *Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones.* Present as open chenopod shrubland less than 1 m high, dominated by Black Bluebush. Occasional scatterings of young Black Oak or Western Rosewood. Occuring on shallow red-brown soil of higher clay content. Often integrating with PCT 154. PCT was defined by an obvious dominance of Black Bluebush over Pearl Bluebush.
- PCT 154: *Pearl Bluebush low open shrubland of the arid and semi-arid plains.* Present as open chenopod shrubland less than 1 m high, dominated by Pearl Bluebush. Occuring on shallow red-brown soil of higher clay content. Often integrating with PCT 153. PCT was defined by an obvious dominance of Pearl Bluebush over Black Bluebush.

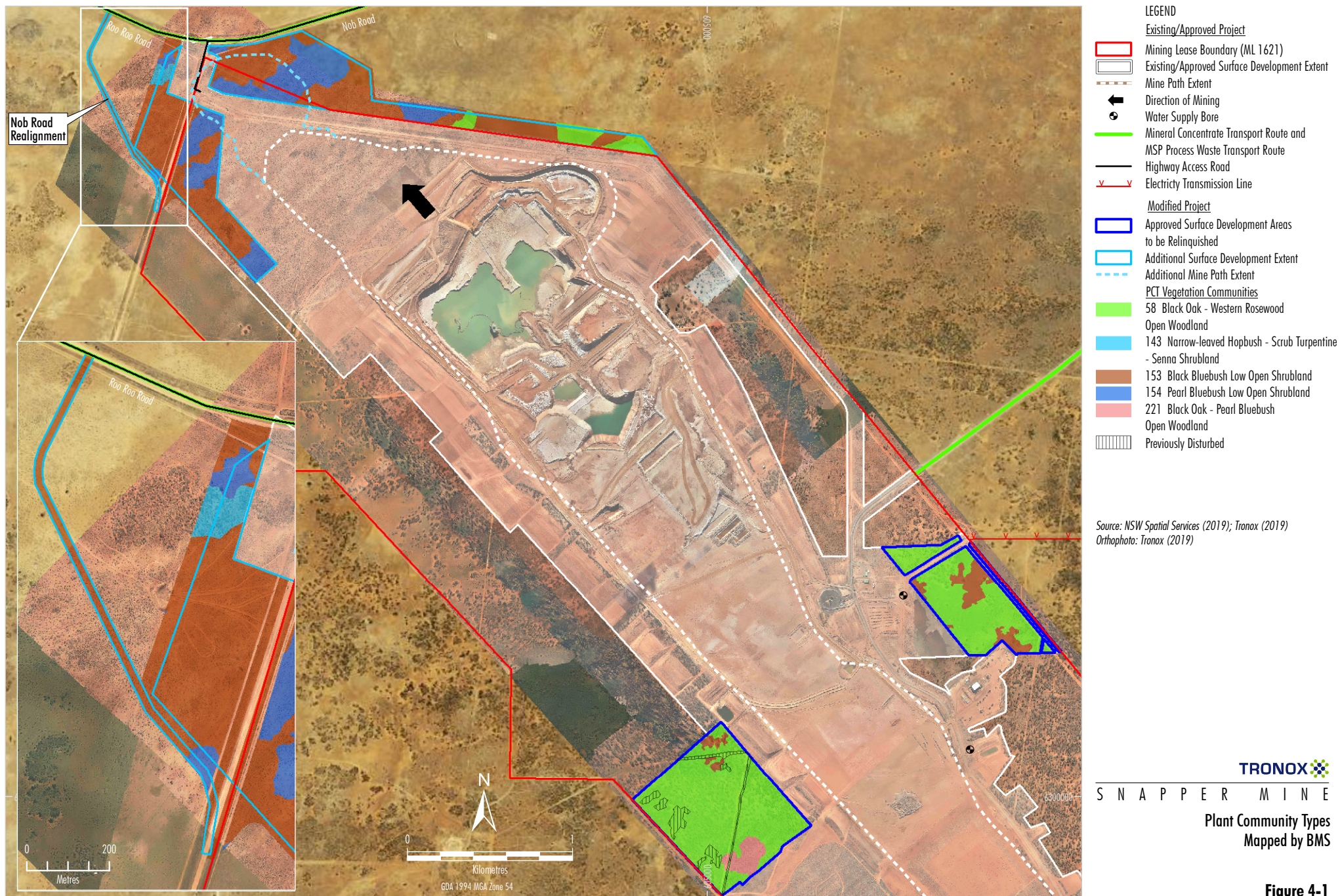


Figure 4-1

The area of each PCT and the number of VI plots conducted in each PCT are presented in **Table 4-1**. VI data is presented in **Table 4-2**.

Table 4-1: PCT Summary for Proposed Surface Disturbance Area – Study Area I

Vegetation Zone	PCT ID	PCT Name	Percent Cleared (DPIE, 2019)	Area (ha)	Number of Plots Completed
Aeolian Chenopod Shrublands					
PCT 153	153	Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	40% (+/- 50%)	52.7	5
PCT 154	154	Pearl Bluebush low open shrubland of the arid and semi-arid plains	43% (+/- 60%)	28.3	4
Sand Plain Mulga Shrublands					
PCT 143	143	Narrow-leaved Hopbush – Scrub Turpentine – Senna shrubland on semi-arid and arid sandplains and dunes	30%	0.7	1
Semi-arid Sand Plain Woodlands					
PCT 58	58	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	50% (+/- 80%)	5.7	3
Total				87.4	13

Table 4-2: Vegetation Integrity Scores – Study Area I

Vegetation Zone	PCT ID	Patch Size	Composition Condition Score*	Structure Condition Score*	Function Condition Score*	Trees with Hollows	Vegetation Integrity Score*
PCT 153	153	>100 ha	88.7	4.2	-	No	19.2
PCT 154	154	>100 ha	89.2	8.5	-	No	27.6
PCT 143	143	>100 ha	82.2	84.9	-	No	83.5
PCT 58	58	>100 ha	69.2	10.8	26.7	Yes	27.5

* Determined by the BAM Calculator.

Study Areas 2 and 3 consist primarily of native woodland vegetation. A number of exotic (and one high threat exotic) forb species were also present in the ground layer. Both areas have had grazing excluded by the mine fence for a long time, though Study Area 3 is closer to the mine workings, infrastructure and offices, and as such is more disturbed. There are still small numbers of goats and kangaroos grazing both areas. Other sections of derived shrubland exist within Study Area 2, and are clearly visible from the aerial photo. Though treeless, they contain extensive amounts of coarse woody debris on ground, and as such are considered to have been areas of *Black Oak – Western Rosewood open woodland* that has undergone dieback or clearing for grazing. A small portion in the north of Study Area 2 contains chenopod shrubland which lacks any evidence of coarse woody debris. The southern section of Study Area 2 contains an increased density of Pearl Bluebush, which is mostly absent from the rest of the study area. This was considered to be a separate PCT, though one of our plots may have been located close to an ecotone, or contained a patch of lower Pearl Bluebush dominance compared to Black Bluebush.

Sections of Study Area 3 mapped as woodland were mostly present as derived shrubland, with extensive remnant coarse woody debris delineating the natural from derived shrubland. There were some smaller patches of natural shrubland and intact *Black Oak – Western Rosewood open woodland*.

Study Areas 2 and 3 contained the following three PCTs:

- PCT 58: *Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion*. Present as isolated clumps of low open Black Oak woodland or derived shrubland. Sparse shrub and ground layer. Occurring on undulating sandplains with red-brown sandy soil. Low tree cover is due to historical clearing or dieback associated with sheep grazing.
- PCT 153: *Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones*. Present as open chenopod shrubland less than 1 m high, dominated by Black Bluebush. Occasional scatterings of young Black Oak or Western Rosewood. Occurring on shallow red-brown soil of higher clay content. PCT was defined by an obvious dominance of Black Bluebush over Pearl Bluebush.

- PCT 221: *Black Oak – Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones*. Present as open woodland 5-10 m high, dominated by Black Oak upper stratum and Pearl Bluebush shrub layer. Occuring on red-brown sandy loam soil. PCT was defined by an obvious dominance of Pearl Bluebush over Black Bluebush in the understorey, which was otherwise absent from most of Study Area 2. There was evidence of timber collection from this PCT, perhaps due to the short, straight, fence-post sized trees (see **Plate 4-1**).



Plate 4-1: Timber Removal from PCT 221, Study Area 2

The area of each PCT and the number of VI plots conducted in each PCT are presented in **Table 4-3**. VI data is presented in **Table 4-4**.

Table 4-3: PCT Summary for Relinquishment Area – Study Areas 2 and 3

Vegetation Zone	PCT ID	PCT Name	Percent Cleared (DPIE, 2019)	Area (ha)	Number of Plots Completed
Aeolian Chenopod Shrublands					
PCT 153	153	Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	40% (+/- 50%)	7.7	3
Semi-arid Sand Plain Woodlands					
PCT 58	58	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	50% (+/- 80%)	79.5	5
PCT 221	221	Black Oak – Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones	30% (+/- 80%)	3.5	2
Total				90.7	10

Table 4-4: Vegetation Integrity Scores – Study Areas 2 and 3

Vegetation Zone	PCT ID	Patch Size	Composition Condition Score*	Structure Condition Score*	Function Condition Score*	Trees with Hollows	Vegetation Integrity Score*
PCT 153	153	>100 ha	98.4	2.5	-	Yes	15.6
PCT 58	58	>100 ha	75.8	8.5	30.6	Yes	27.0
PCT 221	221	>100 ha	73.4	17.2	30.4	Yes	33.7

* Determined by the BAM Calculator.

4.2 THREATENED FLORA SPECIES

A total of 46.1 km of threatened flora traverses were walked over 10 days in Study Area 1, plus additional opportunistic searches conducted whilst mapping PCT boundaries in all three study areas. A total of 23 VI plots were also conducted across five PCTs. No threatened plant species were found via any survey method. No records for threatened plants show up in BioNet (DPIE, 2019a) or Atlas of Living Australia (ALA) (2019) within 10 km of the site. Only one possible threatened species has ever been found during surveys for the Tronox mine complex; one unidentified *Swainsona* species (FloraSearch, 2009).

Ten metre spaced traverses were used to look for the following four shrub/forb species in open vegetation:

- Purple-wood Wattle (*Acacia carneorum*) – No *Acacia* were found in Study Area 1. Two species of *Acacia* were found in Study Area 2 (*A. brachystachya* and *A. colletioides*), which were not the target species. One species occurred as a 2-4 m tall prickly shrub with long, rigid needle-like leaves.
- Mossgiel Daisy (*Brachyscome papillosa*) – Due to the extended drought conditions, very few forbs were in flower or contained enough material to identify. We did identify one *Brachyscome* species (*B. lineariloba*) from Study Area 1, and another from walking around Study Area 2 (*B. ciliaris*), but neither were the target species. It is likely that the site does not present the required microhabitat for the species, as none of the known associated species/communities were present (except a small number of Bladder Saltbush growing on a roadside ditch in Study Area 1).
- A burr-daisy (*Calotis moorei*) – Due to the extended drought conditions, very few forbs were in flower or contained enough material to identify. Extensive areas of chenopod shrublands are present in Study Area 1, but in years of survey work in the local area, the species has not been found.
- Bluebush Daisy (*Cratystylis conocephala*) – Though the location is indicative, and there were large amounts of similar looking Pearl Bluebush in Study Area 1, there was a paucity of intact *Black Oak – Western Rosewood open woodland*. That present was scattered and heavily grazed or derived. Study Area 1 could be considered too degraded for this species to be present.

Two other threatened plant species were not looked for due to habitat constraints. There were no saline lakes or depressions in Study Area 1 for Fleshy Minuria (*Kippistia suaedifolia*) to occur around. Though a small number of Atriplex were found in Study Area 1, none contained flowers, fruit or seed. As such, identifications were difficult. A saltbush (*Atriplex frequens*) is associated with broad drainage tracts, clay flats and irregularly inundated habitats, none of which were present in Study Area 1. It also prefers relatively undisturbed/ungrazed locations which is not a characteristic of Study Area 1.

Though only approximately half of Study Area 1 was officially traversed, I believe we saw enough of it to rule out the likelihood of any of the fore mentioned species being present. As no threatened flora species were found in Study Area 1, no searches were conducted in Study Areas 2 and 3. **Appendix D** lists all flora species identified in VI plots or whilst PCT mapping and conducting flora traverses.

4.3 THREATENED FAUNA SPECIES

Study Area 1 was generally depauperate of habitat features that would be considered important to the target threatened fauna species. There was some standing and fallen dead timber, but only in the 5.7 ha of derived state *Black Oak – Western Rosewood open woodland*. No hollows existed for anything larger than microbats or reptiles.

There were no water points or watercourses in Study Area 1, though a dry farm dam existed immediately to the west of the area. A small dam containing some water was located approximately 375 m to the southeast of the western portion of the study area. The lack of waterbodies renders the site unsuitable for occupation by a number of the bird and frog species.

No large raptor nests were observed in treed areas of Study Area 1.

Study Area 1 is located on mostly grazed shrubland. In general, the habitats of the study area were low quality and lacking in sufficient features for most of the target threatened species. By contrast, Study Area 2 contains substantial amounts of standing and fallen dead timber, abundant nesting opportunities for raptorial birds, and larger hollow bearing trees. In recent years it has been subject to much lower grazing pressure, and is dominated by a structurally

complex woodland mosaic. Study Area 3 contains woodland habitat without stock grazing, but lacks the large Black Oak trees seen in Study Area 2. It is also much closer to the current mine workings.

Appendix D lists all fauna species observed in the study areas during the survey period. Threatened species records are highlighted. **Table 4-5** presents survey results for the targeted threatened fauna species.

Table 4-5: Fauna Species Survey Results

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Survey Result
		BC Act ¹	EPBC Act ²		
Amphibians					
<i>Neobatrachus pictus</i>	Painted Burrowing Frog	E	-	Species	The species is unlikely to utilise the Study Area 1 due to lack of habitat and likelihood that the historical record of the species is erroneous (see explanation below).
Reptiles					
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	-	Species	Species not detected in Study Area 1 with spotlighting or three lines of pitfalls and reptile funnels deployed for nine nights (189 trap nights).
Birds					
<i>Ardeotis australis</i>	Australian Bustard	E	-	Species	Not recorded in Study Area 1, despite 10 days of targeted surveys.
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	Species	Not recorded in Study Area 1, despite 10 days of targeted surveys, flushing fallen timber during flora traverses, call playback and spotlighting.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	Species/Ecosystem	Not recorded in Study Area 1, despite 10 days of targeted surveys. Habitat constraints (potential nest trees, large waterbodies within 1 km) not present (Table 2-4).
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	-	Species/Ecosystem	Not recorded in Study Area 1, despite 10 days of targeted surveys. Habitat constraints (potential nest trees, watercourses or riparian vegetation within 40 m) not present (Table 2-4).
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Species/Ecosystem	Not recorded in Study Area 1, despite 10 days of targeted surveys. One seen foraging within 1 km of Study Area 3. Habitat constraints (potential nest trees) not present (Table 2-4).
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V	-	Species/Ecosystem	One feather found in Study Area 1 indicating foraging habitat. Breeding habitat constraints (hollow bearing trees with hollows greater than 10 cm) not present (Table 2-4).

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	Survey Result
		BC Act ¹	EPBC Act ²		
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Species/Ecosystem	Not recorded in Study Area I, despite 10 days of targeted surveys. Habitat constraints (potential nest trees) not present (Table 2-4).
<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot (eastern subspecies)	E	V	Species/Ecosystem	Not recorded in Study Area I, despite 10 days of targeted surveys. Geographic and habitat constraints (within 30 km of Murray River and <i>Eucalyptus camaldulensis</i>) not present (Table 2-4).
Mammals					
<i>Lasiorhinus latifrons</i>	Southern Hairy-nosed Wombat	E	-	Species	No burrows recorded in Study Area I, despite targeted surveys.

¹ Conservation status under the BC Act (current as at November 2019). E = Endangered, V = Vulnerable.

² Conservation status under the EPBC Act (current as at November 2019). E= Endangered, V = Vulnerable.

³ Biodiversity credit class under the *Threatened Biodiversity Data Collection* (DPIE, 2019b) (current as at November 2019).

4.3.1 THREATENED FROG

The Painted Burrowing Frog (*Neobatrachus pictus*) is classified as a 'Species Credit Species' in the *Threatened Biodiversity Data Collection* (DPIE, 2019b). The specified survey period for this species is November and December when adult males can be heard calling to attract a mate (DPIE, 2019b and 2019c). This species is detectable after heavy rainfall (DECC, 2009). There was neither groundwater in the study area, nor any wet weather during our stay making amphibian searches ineffective. As such the species was not surveyed for.

The BioNet Atlas of NSW Wildlife (DPIE, 2019a) still shows records from 2000 for the Painted Burrowing Frog in the Ginkgo Mine Mining Lease (made by Martin Denny from Mount King Ecological Surveys, the former name of BMS). The records have been revisited and are highly likely to be erroneous. More recent taxonomic and genetic studies have been conducted by Dr Arthur White (Biosphere Environmental Consultants, 2007) and Associate Professor Michael Mahony (The University of Newcastle). The studies concluded that the *Neobatrachus* frogs in the locality were the closely related Common Spadefoot Toad (*Neobatrachus sudelli*). On the strength of these taxonomic and genetic studies from the locality, it is unlikely that the Painted Burrowing Frog is relevant to the study area.

4.3.2 THREATENED REPTILE

The Crowned Gecko (*Lucasium stenodactylum*) is classified as a 'Species Credit Species' in the *Threatened Biodiversity Data Collection* (DPIE, 2019b). The specified survey period is October through March when the species can be readily trapped via pitfall and reptile funnels (DPIE, 2019b). Like most reptiles, they travel deeper underground to avoid the cooler surface temperatures in winter.

There are only two records in BioNet (DPIE, 2019a), and one record from previous surveys in the vicinity for this species (Cenwest 2009). Three lines of pitfalls and reptile funnels were deployed in three different habitats in Study Area I over nine nights (189 trap nights) (**Figure I-3**). Two person-hours were spent spotlight searching areas of coarse woody debris. Nine other reptile species (including one other *Lucasium* species) were captured and/or spotlighted in good abundance, but no Crowned Gecko were found. The Beaded

Gecko (*Lucasium damaeum*) is differentiated from the Crowned Gecko by having no subdigital plates (as opposed to two), spinose scales under digits, and a dorsal stripe splitting at the nape (as opposed to remaining fused over the crown). The Ranges Stone Gecko (*Diplodactylus furcosus*) is another common species in the area, which was absent from many of the NSW field guides until recent editions. This species is differentiated from the Crowned Gecko by being brown-grey in colour (as opposed to red-brown), a short thick tail (as opposed to a long slender tail), and 5-6 cloacal spurs (as opposed to 2-5). The Crowned Gecko is considered unlikely to occur in the mostly grazed shrubland present in Study Area 1.

4.3.3 THREATENED BIRDS

The Australian Bustard, Bush Stone-curlew, White-bellied Sea-Eagle, Black-breasted Buzzard, Little Eagle, Major Mitchell's Cockatoo and Square-tailed Kite were surveyed for over 10 days in October, within the required survey period for all species (DPIE, 2019b). Aside from one Major Mitchell's Cockatoo feather found in Study Area 1, and one Little Eagle seen near Study Area 3, no evidence of breeding habitat was observed in any of the three study areas.

One feather for the Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) was found in Study Area 1, indicating that the study area may be used by the species on occasion. The area however, is unlikely to contain breeding habitat, as none of the trees in Study Area 1 are large enough or old enough to contain 10 cm diameter hollows. The species usually nests in mature mallee trees, and there were no mallee/eucalypt trees over any of the three study areas surveyed.

The Little Eagle (*Hieraetus morphnoides*) must be surveyed for between August and October when the species occupy large stick nests in tall trees among remnant patches of woodland (DPIE, 2019b and 2019c; Marchant and Higgins, 1993). Surveys were conducted for the species over 10 days, and only one individual was seen approximately 1.8 km north-northeast of Study Area 3. As with other target raptor species, none of the three study areas contain suitable breeding habitat by way of nest trees.

The Square-tailed Kite (*Lophoictinia isura*) is a spring-summer breeding migrant to the south-eastern parts of Australia, nesting in trees along or near watercourses from July to February (DPIE, 2019c; Marchant and Higgins, 1993). As such, the survey effort and period for this species should be considered satisfactory. The presence of nest trees was specifically targeted as it is a recognised habitat constraint (DPIE, 2019b). No potential Square-tailed Kite nests were found during the surveys.

The White-bellied Sea-Eagle (*Haliaeetus leucogaster*) must be surveyed for between July and December when the species occupy large stick nests in emergent eucalypts proximal to water bodies (DPIE, 2019b and 2019c; Marchant and Higgins, 1993). No large stick nests, water bodies or Sea-Eagles were observed in the study area. None of the three study areas contain breeding habitat for the White-bellied Sea-Eagle.

The Black-breasted Buzzard (*Hamirostra melanosternon*) breeds in riparian habitat associated with timbered watercourses in the semi-arid areas of the state (DPIE, 2019c; Marchant and Higgins, 1993). As there are no waterbodies or watercourses on site, Study Area I does not contain breeding habitat for the species.

The Australian Bustard (*Ardeotis australis*) was surveyed for in October by diurnal census and was not located. This species can be surveyed for year-round (DPIE, 2019b). BioNet (DPIE, 2019a) and previous surveys for Tronox have not located the species in the local area. As such, Study Area I is not likely to contain habitat for the species.

The Bush Stone-curlew (*Burhinus grallarius*) was surveyed for in October by spotlighting, call playback and diurnal flushing of habitat containing fallen logs. This species can be surveyed for year-round (DPIE, 2019b). The species was not sighted or heard during the 10-day survey period, and can be considered absent from the Study Area I. Fox (*Vulpes vulpes*) scats were observed in the study area, reducing the likelihood of the species presence considerably.

Study Area I should be considered foraging (Ecosystem) habitat for all birds but the White-bellied Sea-Eagle, Australian Bustard and Bush Stone-curlew.

4.3.4 THREATENED MAMMAL

The Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*) was surveyed for in conjunction with threatened flora traverses and PCT mapping of Study Area I. This species can be surveyed for year-round (DPIE, 2019b). No wombat burrows were found during almost 50 km of site traverses at 10 m spacings, only rabbit (*Oryctolagus cuniculus*) warrens. These contained entry holes that would be too small for wombat occupation. The species is not known from the location, and no evidence has been found during extensive surveys of the Snapper, Ginkgo and Crayfish areas over the last 19 years. As such, Study Area I does not contain habitat for the Southern Hairy-nosed Wombat.

5.0 POTENTIAL IMPACTS

5.1 VEGETATION CLEARANCE

The total Northern Extension Modification area would be approximately 87.4 ha. The Northern Extension Modification has been designed to avoid or minimise impacts on native vegetation by predominantly locating the supporting infrastructure in derived shrubland subject to high density grazing.

5.2 WEED INCURSION

There would be no change to the management of weeds and introduced flora at the Snapper Mine as a result of the Northern Extension Modification, and therefore there is unlikely to be an increase in potential impacts from introduced flora.

5.3 FERAL ANIMALS

There would be no change to the management of feral animals at the Snapper Mine as a result of the Northern Extension Modification, and therefore there is unlikely to be an increase in potential impacts from feral animals that are already likely to use the habitat in the area.

5.4 ARTIFICIAL LIGHTING

There would be no change to the use of artificial lighting at the Snapper Mine as a result of the Northern Extension Modification and therefore there is unlikely to be an increase in potential impacts from artificial lighting.

5.5 NOISE

The Northern Extension Modification is not likely to materially change the noise emissions from the Snapper Mine as the Northern Extension Modification would not change the mining method, fleet or production rate.

5.6 DUST

The Northern Extension Modification is not likely to materially change the dust emissions from the Snapper Mine as the Northern Extension Modification would not change the mining method, fleet or production rate. The Northern Extension Modification would move disturbance boundaries closer to vegetation not previously subjected to dust from the mine. Such potential impacts would be limited and any dust effects would be mitigated by regular watering of roads and soil stockpiles.

5.7 BUSHFIRE RISK

There would be no change to the management of bushfire risk at the Snapper Mine as a result of the Northern Extension Modification.

5.8 RELINQUISHMENT AREA

In addition to the above, Tronox would relinquish (not clear) approximately 90.7 ha of *Black Bluebush low open shrubland* (PCT 153), *Black Oak – Western Rosewood open woodland* (PCT 58) and *Black Oak – Pearl Bluebush open woodland* (PCT 221) within the Project Approval Boundary (**Table 5-1**). This would result in a net positive outcome for biodiversity values in the local area.

Table 5-1: Comparison of Vegetation Impacts verse Relinquishment

Vegetation to be Cleared in the Northern Extension Modification Area	Vegetation Retained in the Relinquishment Area	Net Outcome
Approximately 87.4 ha of <i>Black Bluebush low open shrubland</i> (PCT 153), <i>Pearl Bluebush low open shrubland</i> (PCT 154), <i>Narrow-leaved Hopbush – Scrub Turpentine – Senna shrubland</i> (PCT 143) and <i>Black Oak – Western Rosewood open woodland</i> (PCT 58)	Approximately 90.7 ha of <i>Black Bluebush low open shrubland</i> (PCT 153), <i>Black Oak – Western Rosewood open woodland</i> (PCT 58) and <i>Black Oak – Pearl Bluebush open woodland</i> (PCT 221)	Retention of approximately 90.7 ha of <i>Black Bluebush low open shrubland</i> (PCT 153), <i>Black Oak – Western Rosewood open woodland</i> (PCT 58) and <i>Black Oak – Pearl Bluebush open woodland</i> (PCT 221) that would no longer be cleared within the Project Approval Boundary, resulting in a net reduction in disturbance footprint of 3.3 ha

6.0 IMPACT ASSESSMENT – BC ACT

Table 6-1 provides an assessment of the impacts of the Northern Extension Modification on biodiversity values.

Table 6-1: Impacts of the Northern Extension Modification on Biodiversity Values

Biodiversity Value	Meaning	Relevant (✓ or NA)*	Explanation
<i>Vegetation abundance – 1.4(b) BC Regulation</i>	<i>Occurrence and abundance of vegetation at a particular site</i>	✓	Figure 4-1 shows the PCTs present in the Study Areas. The Northern Extension Modification has been designed to avoid or minimise impacts on native vegetation by predominantly locating the supporting infrastructure in derived shrubland subject to high density grazing. The Northern Extension Modification would relinquish approved development in Study Areas 2 and 3 (slightly larger in size than Study Area 1) with more intact vegetation for proposed development on mostly derived and grazed shrubland in Study Area 1. Accordingly, the Northern Extension Modification would not result in an increased impact on vegetation abundance.
<i>Vegetation integrity 1.5(2)(a) BC Act</i>	<i>Degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state</i>	✓	The VI scores calculated using the BAM Calculator indicates that the majority of the native vegetation to be cleared is generally low (Table 4-2). The zone with the highest VI score (83.5) would be the least impacted (0.7 ha), while the majority of surface development (52.7 ha) would occur in the zone with the lowest VI score (19.2) (Tables 4-1 and 4-2). When native vegetation is removed the VI score becomes zero. However, vegetation zones within the areas to be relinquished would no longer become zero and instead would remain at their current VI scores (Table 4-4). Accordingly, the Northern Extension Modification would not result in an increased impact on vegetation integrity.

Biodiversity Value	Meaning	Relevant (✓ or NA)*	Explanation
Habitat suitability 1.5(2)(b) BC Act	Degree to which the habitat needs of threatened species are present at a particular site	✓	The PCTs present in the Northern Extension Modification area provide marginal habitat for threatened fauna (e.g. some birds may forage on grass seeds from time to time). The native vegetation that would be cleared has been subject to past disturbances (such as vegetation clearance and grazing), which makes the habitat generally poor quality. The derived shrubland of PCT 58, grazed shrubland of PCT 143, intact and grazed shrublands of PCT 153 and intact and grazed shrublands of PCT 154 are not TECs and no threatened flora species have been recorded within Study Area 1 (Section 3.2). The Northern Extension Modification has been designed to avoid impacts on habitat by: • predominantly locating the supporting infrastructure in derived shrubland subject to high density grazing and lacking in many habitat features such as waterbodies and hollow-bearing trees; and • relinquishing approved clearing and surface development in Study Areas 2 and 3 (slightly larger in size than Study Area 1) in exchange for surface development in Study Area 1. The Northern Extension Modification would not impact rocks, karst, caves, crevices, cliffs, human made structures or non-native vegetation known to be associated with any threatened species. The Northern Extension Modification is unlikely to reduce the viability of any adjacent habitat due to noise, dust or light spill during construction or operation due to the following: • there would be no change the mining method, fleet or production rate; • any dust effects would be mitigated by regular watering of roads and soil stockpiles; and • there would be no change to the use of artificial lighting. In addition, measures would be implemented to minimise bushfire risk associated with the Northern Extension Modification. Accordingly, the Northern Extension Modification would not result in an increased impact on habitat suitability.

Biodiversity Value	Meaning	Relevant (✓ or NA)*	Explanation
Threatened species abundance 1.4(a) BC Regulation	Occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site	✓	The Northern Extension Modification is unlikely to impact the occurrence and abundance of threatened species, or their habitat, in the locality. The Northern Extension Modification has been designed to avoid potential habitat as far as practicable in consideration of other environmental and practical constraints. Study Area 1 was generally depauperate of habitat features that would be considered important to the target threatened fauna species and as such the majority of species are considered unlikely to occur. Additionally, vegetation clearance measures would be implemented to minimise potential impacts on biodiversity, including pre-clearing fauna inspections. Accordingly, the Northern Extension Modification would not result in an increased impact on threatened species abundance.
Habitat connectivity 1.4(c) BC Regulation	Degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range	✓	The majority of clearance for the Northern Extension Modification would be of derived and grazed shrubland. Given the previous amount of disturbance through clearing and grazing activities and the lack of important habitat features (hollow-bearing trees, water bodies, native grassland, etc), habitat is generally of low quality in Study Area 1. Additionally, approved surface development areas (Study Areas 2 and 3) with better quality habitat would be relinquished for the proposed surface development in Study Area 1. Any existing connectivity in Study Areas 2 and 3 (slightly larger in size than Study Area 1) would remain. Study Area 3 adjoins existing Snapper Mine and Ginkgo Mineral Sands Mine Offset Areas. Accordingly, the Northern Extension Modification would not result in an increased impact on habitat connectivity.

Biodiversity Value	Meaning	Relevant (✓ or NA)*	Explanation
<i>Threatened species movement</i> 1.4(d) BC Regulation	<i>Degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle</i>	NA	The Northern Extension Modification is not likely to impact a well-defined movement pattern for any particular species, given the majority of clearance would be of derived and grazed shrubland. Accordingly, the Northern Extension Modification would not result in an increased impact on threatened species movement.
<i>Flight path integrity</i> 1.4(e) BC Regulation	<i>Degree to which the flight paths of protected animals over a particular site are free from interference</i>	NA	The Northern Extension Modification would not interfere with any flight paths of protected animals, given the majority of clearance would be of derived and grazed shrubland. Accordingly, the Northern Extension Modification would not result in an increased impact on flight path integrity.
<i>Water sustainability</i> 1.4(f) BC Regulation	<i>Degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site</i>	NA	The Northern Extension Modification would not impact water quality, water bodies or hydrological processes that are known to sustain a threatened species or TEC. Study Area 1 does not contain any watercourses or artificial watering points. Accordingly, the Northern Extension Modification would not result in an increased impact on hydrological processes that are known to sustain a threatened species or TEC.

* A biodiversity value is not relevant to a proposed development if the value is not present on the development site and there is no potential for direct or indirect impacts on the biodiversity value if it occurs off-site (DP&E, 2018).

The Northern Extension Modification would not result in an increased impact on vegetation abundance, vegetation integrity, habitat suitability, threatened species abundance, habitat connectivity, threatened species movement, flight path integrity or hydrological processes that are known to sustain a threatened species or ecological community.

7.0 IMPACT ASSESSMENT – EPBC ACT

Federal assessment under the EPBC Act was conducted via the *Protected Matters Search Tool* (DEE, 2019b). This was used to ascertain whether Matters of National Environmental Significance (MNES) were likely to occur within 10 km of the site. These include:

- World Heritage Properties;
- National Heritage Places;
- Wetlands of International Importance;
- Commonwealth Marine Area;
- Great Barrier Reef Marine Park;
- Nuclear Actions;
- A Water Resource, in relation to coal seam gas development and large coal mining development;
- Listed Threatened Ecological Communities;
- Listed Threatened Species; and
- Listed Migratory Species.

Three wetlands of international importance are listed, but all occur at least 100 km downstream. With the relinquishment of approved surface development in Study Areas 2 and 3, there is unlikely to be any impact (or additional impact over that already approved) from the Northern Extension Modification.

One listed TEC is listed as potentially occurring within 10 km of site:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Endangered). This community was not found to occur in Study Area 1 (or Study Areas 2 and 3). None of the characteristic species were present, particularly Buloke (*Allocasuarina luehmannii*). As such, there would be no increased impact on this MNES.

Of the eleven listed threatened species, none are listed as occurring proximal to the Northern Extension Modification, despite extensive historical surveys of the area (**Appendix A**). No threatened plants were found during the survey. No Federally listed threatened fauna species

(or habitat constraints for) were observed. There is no free water on site. As such, there would be no impact on wetland birds.

No migratory species were found in Study Area I during the bird surveys.

Due to the paucity of habitat values for threatened species in Study Area I, the fact it is predominantly grazed and the fact that an area of approved surface development with greater habitat values is to be relinquished, no increased impact on MNES is expected to occur. As such, no referral is likely to be necessary under the EPBC Act.

8.0 CONCLUSION

The cumulative impacts of the Northern Extension Modification on native vegetation loss and reduction of fauna habitat are small, and negligible in the regional context given the proposed surface development is to be located on what is predominantly derived shrubland subject to high intensity grazing. Additionally, no TECs would be impacted. It is therefore considered that the Northern Extension Modification would result in no material adverse change to the extent, duration and severity of already approved impacts.

In conclusion, the Northern Extension Modification:

- would not increase impacts on biodiversity values as defined by the BC Act and therefore, if the DPIE is satisfied, a BDAR is not required; and
- would not significantly impact threatened species, TECs or migratory species listed under the EPBC Act.

In addition to the above, Tronox would relinquish (not clear) approximately 90.7 ha of *Black Bluebush low open shrubland* (PCT 153), *Black Oak – Western Rosewood open woodland* (PCT 58) and *Black Oak – Pearl Bluebush open woodland* (PCT 221) within the Project Approval Boundary. This would result in a net positive outcome for biodiversity values in the local area.

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19 November 2019

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10.0 APPENDICES

10.1 APPENDIX A: THREATENED FLORA AND FAUNA PREVIOUSLY RECORDED IN THE WIDER LOCALITY

Table 10-1: Threatened Flora and Fauna Previously Recorded in the Wider Locality

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	ALA/BioNet Database ⁴	Previous Survey Results in the Wider Locality ⁵
		BC Act ¹	EPBC Act ²			
Plants						
<i>Swainsona spp.</i>	Swainson-pea (tentative)	?	?	Species	-	a
Reptiles						
<i>Strophurus elderi</i>	Jewelled Gecko	V	-	Ecosystem	✓	b, c
<i>Delma australis</i>	Marble-faced Delma	E	-	Ecosystem	✓	b, d
<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	V	-	Ecosystem	✓	e, f
<i>Ramphotyphlops endoterus</i>	Interior Blind Snake	E	-	Ecosystem	✓	g
<i>Lucasium stenodactylum</i>	Crowned Gecko	V	-	Species	-	c
Amphibians						
<i>Neobatrachus pictus</i>	Painted Burrowing Frog	E	-	Species	✓	*
Birds						
<i>Circus assimilis</i>	Spotted Harrier	V	-	Ecosystem	✓	h
<i>Falco hypoleucos</i>	Grey Falcon	E	-	Ecosystem	-	f

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	ALA/BioNet Database ⁴	Previous Survey Results in the Wider Locality ⁵
		BC Act ¹	EPBC Act ²			
<i>Hieraetus morphnoides</i>	Little Eagle	V	-	Species/Ecosystem	✓	b, d, i
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V	-	Species/Ecosystem	✓	b, c, d, e, f, i, j, k
<i>Epthianura albifrons</i>	White-fronted Chat	V	-	Ecosystem	✓	b
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	Ecosystem	✓	d
<i>Melanodryas cucullate cucullata</i>	Hooded Robin (south-eastern form)	V	-	Ecosystem	✓	b, d, e, f, i, k
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	-	Ecosystem	ALA	f, k
<i>Calamanthus campestris</i>	Rufous Fieldwren	V	-	Ecosystem	ALA (1989)	-
<i>Ninox connivens</i>	Barking Owl	V	-	Species/Ecosystem	-	f
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	-	Species/Ecosystem	-	j
<i>Oxyura australis</i>	Blue-billed Duck	V	-	Ecosystem	-	f
<i>Stictonetta naevosa</i>	Freckled Duck	V	-	Ecosystem	-	f
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	-	Ecosystem	-	f
<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot (eastern subspecies)	E	V	Species/Ecosystem	-	f
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Species/Ecosystem	-	f
<i>Lathamus discolor</i>	Swift Parrot	E	CE	Species/Ecosystem	-	e

Scientific Name	Common Name	Conservation Status		Biodiversity Credit Class ³	ALA/BioNet Database ⁴	Previous Survey Results in the Wider Locality ⁵
		BC Act ¹	EPBC Act ²			
Mammals						
<i>Sminthopsis macroura</i>	Striped-faced Dunnart	V	-	Ecosystem	✓	-
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	-	Ecosystem	✓	b, e, f
<i>Chalinolobus picatus</i>	Little Pied Bat	V	-	Ecosystem	✓	b, c, d, e, f, h, i, k, l
<i>Vespadelus baverstocki</i>	Inland Forest Bat	V	-	Ecosystem	✓	b, c, d, e, f, i, k, l
<i>Pseudomys bolami</i>	Bolam’s Mouse	E	-	Ecosystem	✓	b

* This record has been revisited and is likely to be erroneous (see Section 4.3.1).

¹ Conservation status under the BC Act (current as at November 2019). CE = Critically Endangered, E = Endangered, V = Vulnerable.

² Conservation status under the EPBC Act (current as at November 2019). CE = Critically Endangered, E = Endangered, V = Vulnerable.

³ Biodiversity Credit Class under the *Threatened Biodiversity Data Collection* (DPIE, 2019) (current as at November 2019).

⁴ Atlas of Living Australia (2019); Department of Planning, Industry and Environment (2019a)

⁵ Previous survey results from Project area at given sampling sites sourced from the following:

a = FloraSearch (2009)

b = BMS (2017)

c = Cenwest (2009)

d = BMS (2012)

e = Western Research Institute (2007)

f = Mount King Ecological Surveys (2001)

g = Cook (2014)

h = GHD (2016)

i = BMS (2014)

j = Birds Australia (2013)

k = Ogyris Ecological Research (2005-2017)

l = GHD (2017)

10.2 APPENDIX B: VEGETATION INTEGRITY PLOT DATA – STUDY AREA I

Table 10-2: BAM Attributes (Composition and Structure) Used to Derive Vegetation Integrity Score – Study Area I

Veg. Zone	Plot ID	Tree		Shrub		Grass		Forb		Fern		Other		HTE
		Richness	Cover	Richness	Cover	Richness	Cover	Richness	Cover	Richness	Cover	Richness	Cover	Cover
PCT 153	1	1	2.0	4	30.3	1	0.1	3	0.3	0	0	0	0	0.1
PCT 153	2	0	0	7	8.5	1	0.1	6	0.6	0	0	0	0	0.1
PCT 153	3	0	0	5	2.0	2	0.2	4	0.4	0	0	1	0.1	0.1
PCT 153	4	0	0	4	4.3	1	0.1	3	0.3	0	0	0	0	0.1
PCT 153	5	0	0	4	8.6	3	0.3	6	0.6	0	0	0	0	0.1
PCT 154	6	0	0	6	17.4	2	0.2	7	0.7	0	0	0	0	0.1
PCT 154	7	0	0	5	11.3	1	0.1	3	0.3	0	0	0	0	0.1
PCT 154	8	0	0	6	16.4	0	0	2	0.2	0	0	0	0	0.1
PCT 154	9	0	0	5	15.4	3	0.3	3	0.3	0	0	0	0	0.1
PCT 143	10	0	0	9	23.6	2	0.2	5	0.5	0	0	0	0	0.1
PCT 58	11	2	3.1	4	15.3	0	0	1	0.1	0	0	0	0	0.1
PCT 58	12	1	3	8	15.8	5	0.5	7	0.7	0	0	1	0.1	0.1
PCT 58	13	0	0	6	1.7	1	0.1	4	0.4	0	0	0	0	0.1

Table 10-3: BAM Attributes (Function) Used to Derive Vegetation Integrity Score – Study Area I

Veg. Zone	Plot ID	Stem class (DBH), count, a = absent, p = present							# large trees (>30cm for semi-arid woodland)	# trees with hollows	Length of logs (m)	Mean litter cover (%)
		80+ cm	50-79 cm	30-49 cm	20-29 cm	10-19 cm	5-9 cm	<5 cm				
PCT I53	1	-	-	p	a	p	a	a	1	0	2.0	12.8
PCT I53	2	-	-	a	a	a	a	a	0	0	0	0.4
PCT I53	3	-	-	a	a	a	a	a	0	0	0	9.8
PCT I53	4	-	-	a	a	a	a	a	0	0	0	0
PCT I53	5	-	-	a	a	a	a	a	0	0	0	3.2
PCT I54	6	-	-	a	a	a	a	a	0	0	0	5.4
PCT I54	7	-	-	a	a	a	a	a	0	0	0	2.4
PCT I54	8	-	-	a	a	a	a	a	0	0	0	1.2
PCT I54	9	-	-	a	a	a	a	a	0	0	0	1.2
PCT I43	10	-	-	a	a	a	a	a	0	0	0	33.6
PCT 58	11	-	-	a	p	a	a	p	0	6	44.0	7
PCT 58	12	-	-	a	p	p	a	a	0	1	20.5	6.4
PCT 58	13	-	-	a	a	a	a	a	0	0	26.0	1.2



Plate 10-1: VIS Plot Area | W-Dod (PCT143)



Plate 10-2: VIS Plot Area IW-ShrubI (PCT154)



Plate 10-3: VIS Plot Area IW-OakI (PCT153)



Plate 10-4: VIS Plot Area IE-Shrub2 (PCT153)



Plate 10-5: VIS Plot Area I E-Shrub3 (PCT153)



Plate 10-6: VIS Plot Area I E-Shrub4 (PCT154)



Plate 10-7: VIS Plot Area IE-Oak2 (PCT58)



Plate 10-8: VIS Plot Area I E-Oak3 (PCT58)



Plate 10-9: VIS Plot Area IE-Oak4 (PCT58)

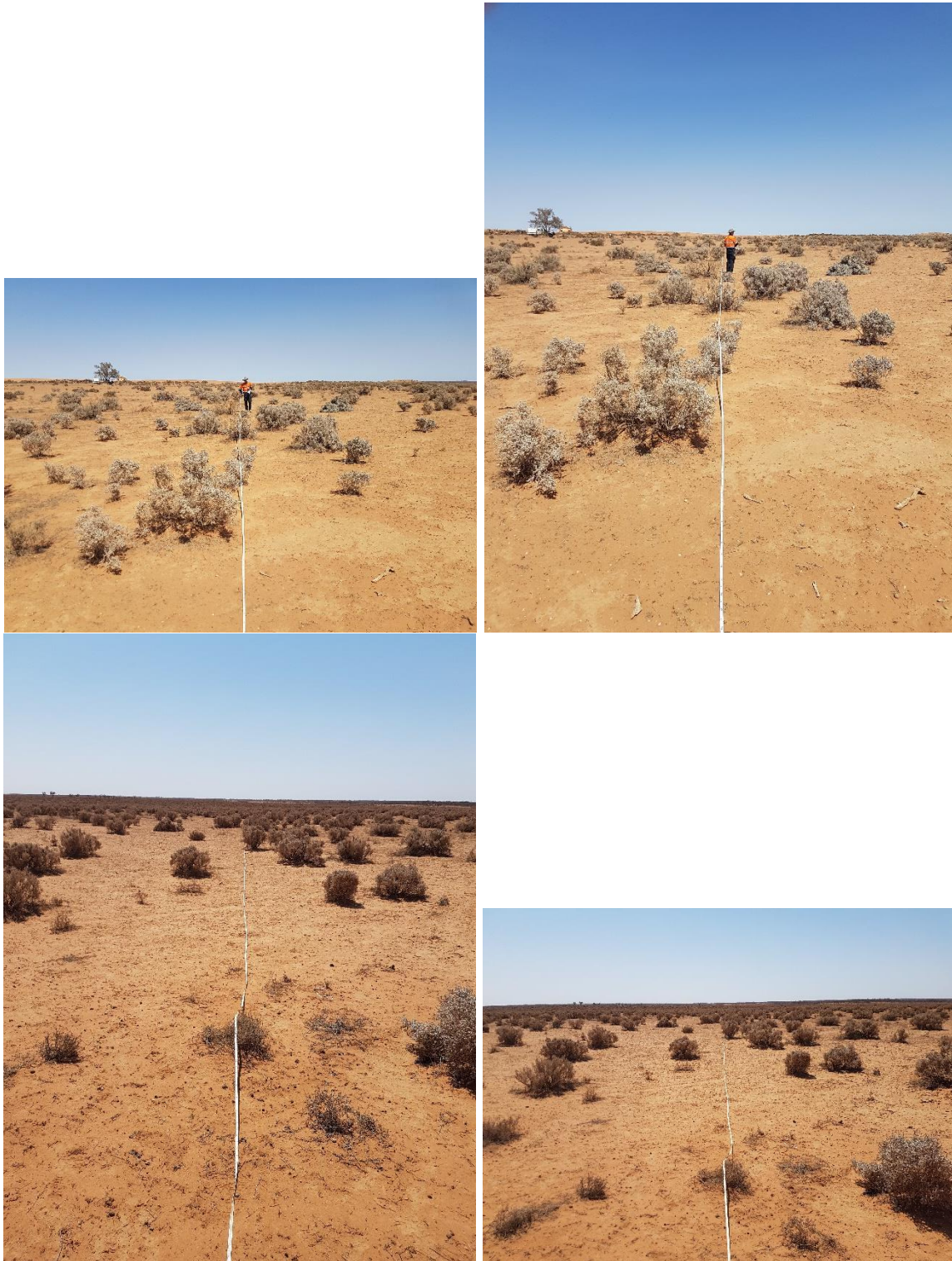


Plate 10-10: VIS Plot Area IE-Shrub5 (PCT154)

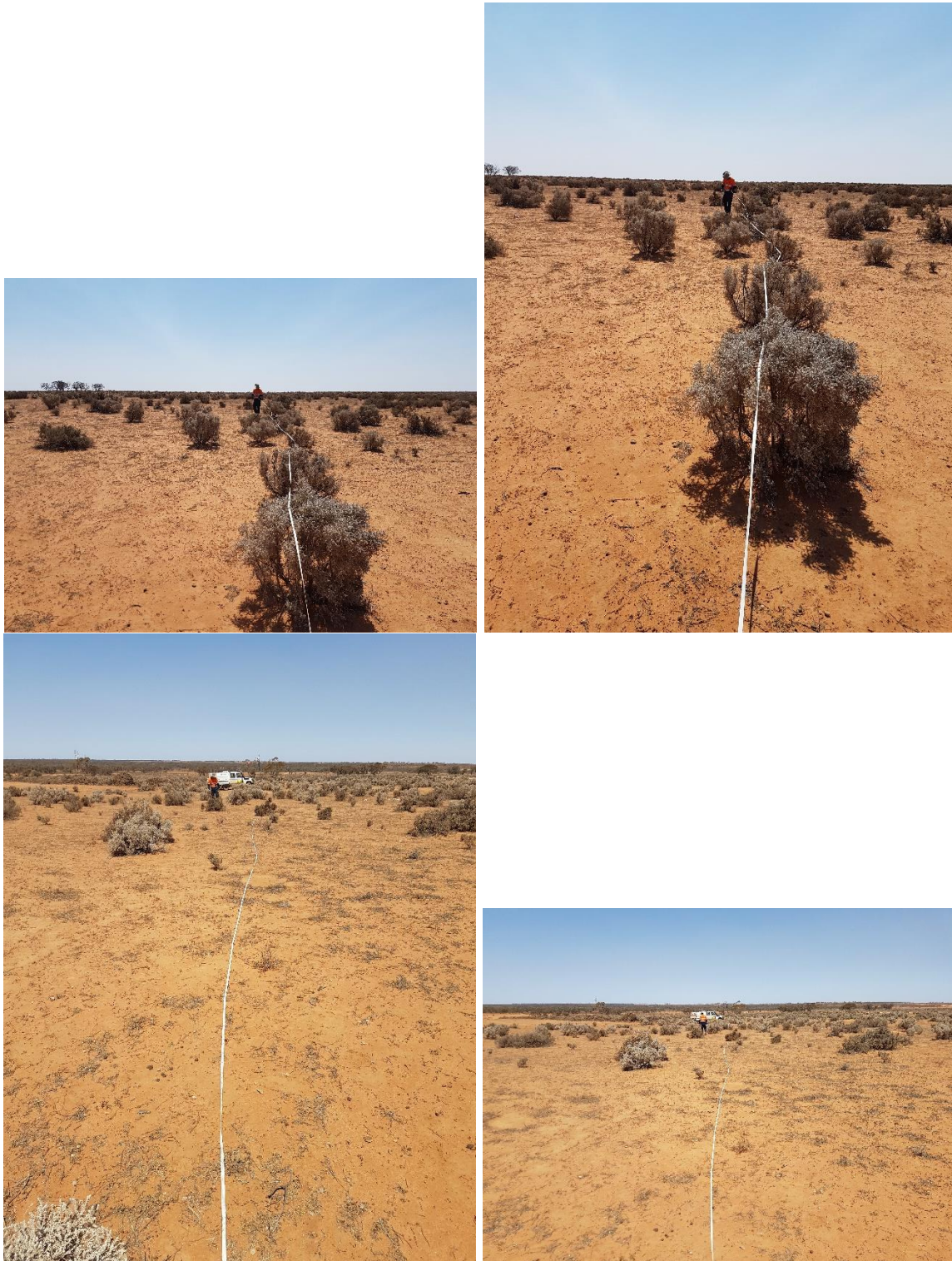


Plate 10-11: VIS Plot Area IW-Shrub6 (PCT154)



Plate 10-12: VIS Plot Area IW-Shrub7 (PCT153)



Plate 10-13: VIS Plot Area IW-Shrub8 (PCT153)

10.3 APPENDIX C: VEGETATION INTEGRITY PLOT DATA – STUDY AREAS 2 AND 3

Table 10-4: BAM Attributes (Composition and Structure) Used to Derive Vegetation Integrity Score – Study Areas 2 and 3

Veg. Zone	Plot ID	Tree		Shrub		Grass		Forb		Fern		Other		HTE
		Richness	Cover	Richness	Cover	Richness	Cover	Richness	Cover	Richness	Cover	Richness	Cover	Cover
PCT 153	14	0	0	8	7.9	2	0.2	6	0.7	0	0	0	0	0.1
PCT 153	15	0	0	7	7.5	3	0.3	8	0.8	0	0	0	0	0.1
PCT 153	16	0	0	4	5.3	2	0.2	6	0.7	0	0	0	0	0.1
PCT 58	17	2	7	12	8.3	1	0.1	10	1.0	0	0	1	0.1	0.1
PCT 58	18	2	2.1	7	11.6	1	0.1	6	0.6	0	0	0	0	0.1
PCT 58	19	0	0	5	4.7	1	0.1	10	1.0	0	0	0	0	0.1
PCT 58	20	2	5	5	15.8	2	0.2	10	1.1	0	0	1	0.1	0.1
PCT 58	21	0	0	4	4.0	2	0.2	7	0.7	0	0	0	0	0.1
PCT 221	22	2	3.1	6	9.6	2	0.2	10	1.1	0	0	0	0	0.1
PCT 221	23	1	5	6	15.5	2	0.2	5	0.5	0	0	0	0	0.1

Table 10-5: BAM Attributes (Function) Used to Derive Vegetation Integrity Score – Study Areas 2 and 3

Veg. Zone	Plot ID	Stem class (DBH), count, a = absent, p = present							# large trees (>30cm for semi-arid woodland)	# trees with hollows	Length of logs (m)	Mean litter cover (%)
		80+ cm	50-79 cm	30-49 cm	20-29 cm	10-19 cm	5-9 cm	<5 cm				
PCT 153	14	-	-	a	a	a	a	a	0	0	6.0	0.4
PCT 153	15	-	-	a	a	a	a	a	0	0	0	3.4
PCT 153	16	-	-	a	a	a	a	a	0	3	4.0	1.8
PCT 58	17	-	-	a	p	p	p	p	0	3	38.2	21.6
PCT 58	18	-	-	a	p	p	a	a	0	1	38.0	4.8
PCT 58	19	-	-	a	a	a	a	a	0	0	0	6.2
PCT 58	20	-	-	p	p	p	a	a	1	4	31.5	26.8
PCT 58	21	-	-	a	a	a	a	a	0	0	82.5	11.0
PCT 221	22	-	-	a	p	a	a	a	0	3	86.0	12.4
PCT 221	23	-	-	a	p	p	p	a	0	2	102.5	4.8



Plate 10-14: VIS Plot Area2-OakI (PCT58)



Plate 10-15: VIS Plot Area3-ShrubI (PCT153)

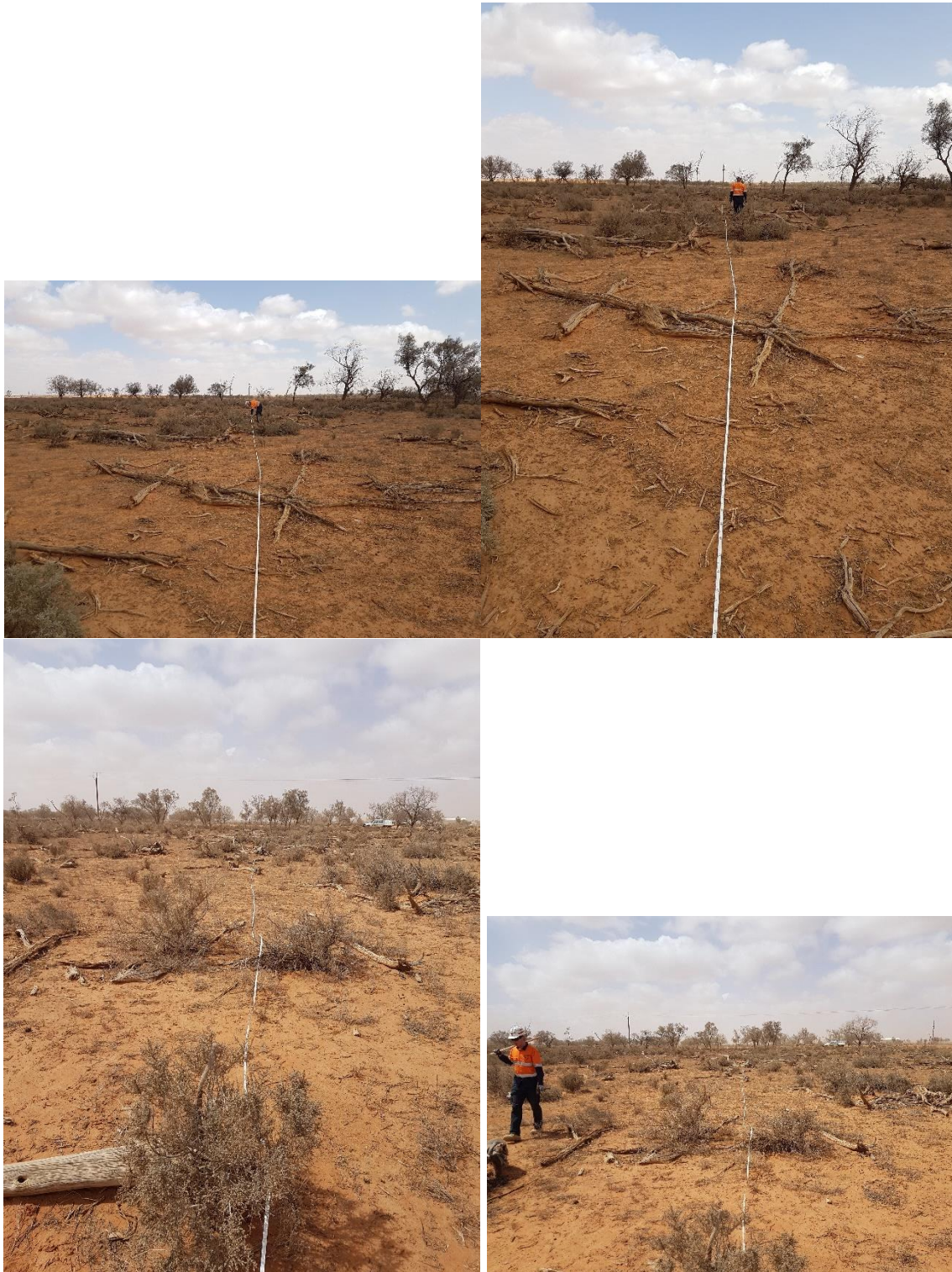


Plate 10-16: VIS Plot Area3-Oak2 (PCT58)



Plate 10-17: VIS Plot Area3-Oak3 (PCT58)



Plate 10-18: VIS Plot Area2-PearlWI (PCT221)



Plate 10-19: VIS Plot Area2-PearlW2 (PCT221)

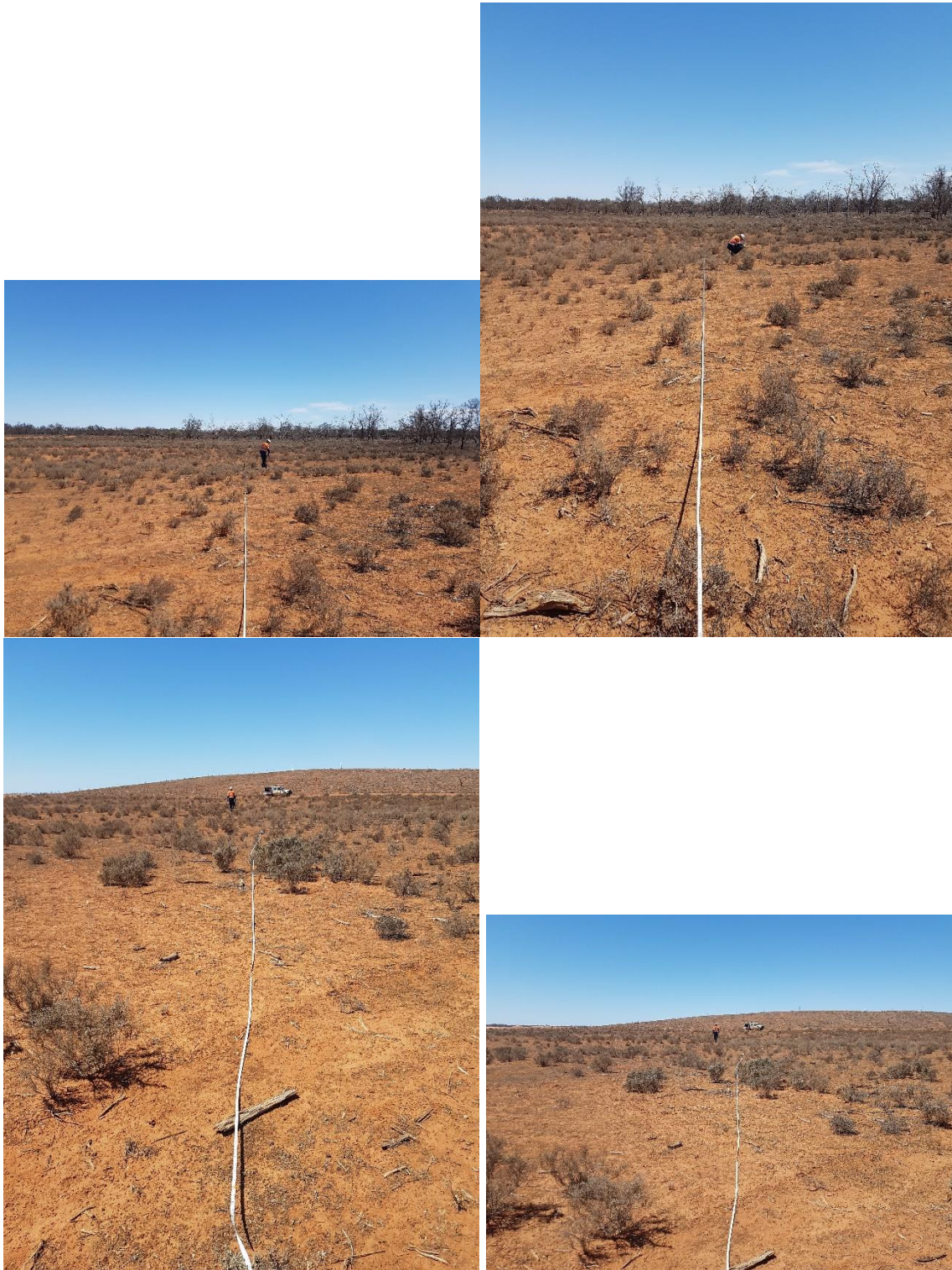


Plate 10-20: VIS Plot Area2-Oak4 (PCT58)

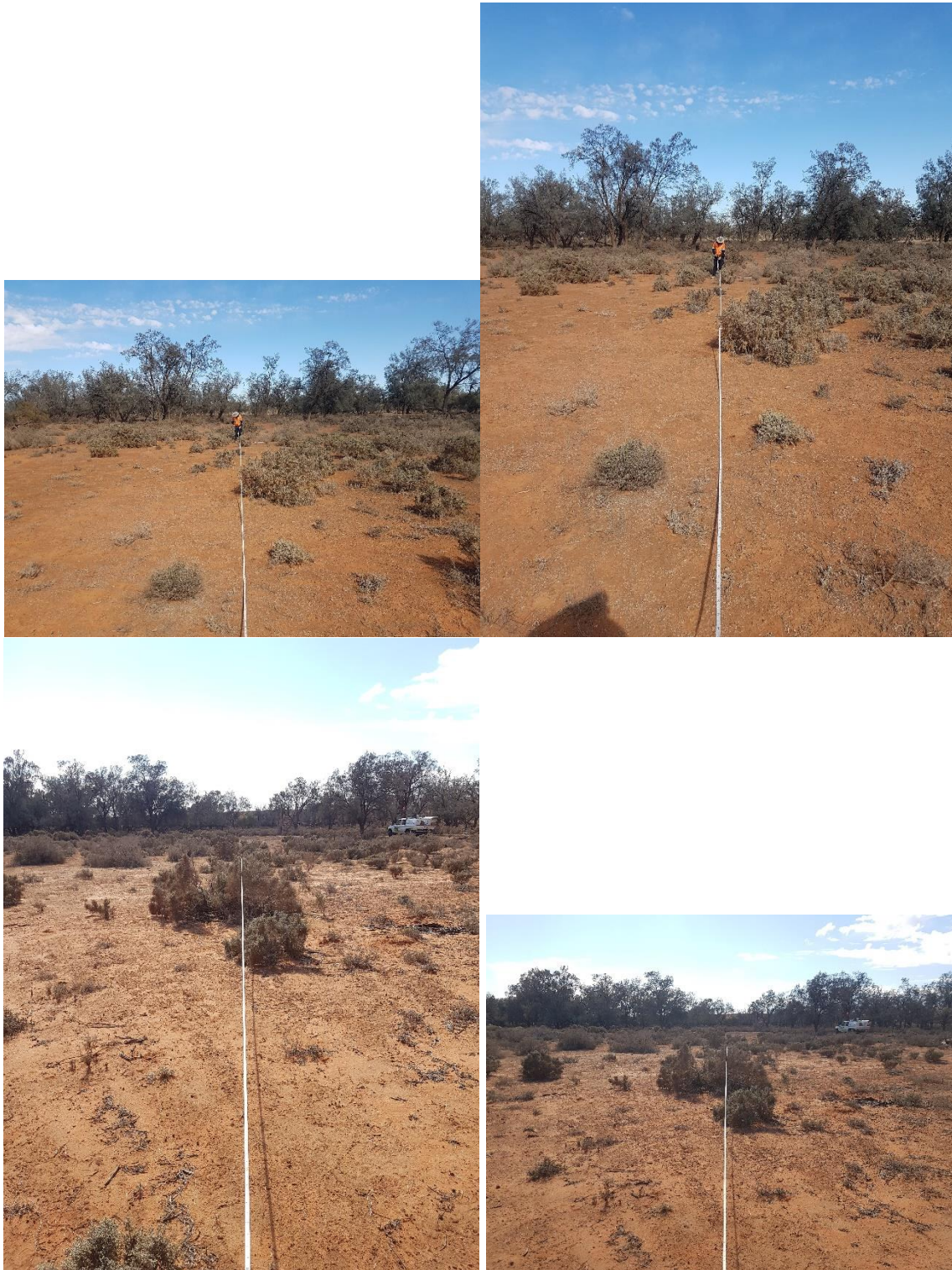


Plate 10-21: VIS Plot Area2-Shrub2 (PCT153)



Plate 10-22: VIS Plot Area3-Shrub3 (PCT153)



Plate 10-23: VIS Plot Area2-Oak5 (PCT58)

10.4 APPENDIX D: FLORA AND FAUNA SPECIES LOCATED WITHIN THE STUDY AREAS

Table 10-6: Flora Species Located Within the Study Areas

Family name	Scientific name	Common name	Native, Exotic, High Threat Exotic	Study Area 1	Study Areas 2+3
Plants					
Aizoaceae	<i>Psilocaulon granulicaule</i>	Wiry Noon-flower	E	✓	-
Aizoaceae	<i>Tetragonia eremaea</i>	-	N	✓	✓
Aizoaceae	<i>Tetragonia moorei</i>	-	N	✓	✓
Apocynaceae	<i>Marsdenia australis</i>	Doubah	N		✓
Asphodelaceae	<i>Asphodelus fistulosus</i>	Onion Weed	N	✓	✓
Asteraceae	<i>Actinobole uliginosum</i>	Flannel Cudweed, Cotton Weed	N	-	✓
Asteraceae	<i>Brachyscome lineariloba</i>	Hard-headed Daisy	N	✓	✓
Asteraceae	<i>Brachyscome ciliaris</i>	Variable Daisy	N	-	✓
Asteraceae	<i>Calocephalus sonderi</i>	Pale Beauty-heads	N	✓	✓
Asteraceae	<i>Calotis hispidula</i>	Bogan Flea	N	✓	✓
Asteraceae	<i>Hypochaeris spp.</i>	Flatweed	E	✓	-
Asteraceae	<i>Lemooria burkittii</i>	Wires and Wool	N	-	✓
Asteraceae	<i>Leontodon rhagadioloides</i>	Cretan Weed	E	✓	-
Asteraceae	<i>Rhodanthe corymbiflora</i>	Grey Sunray	N	-	✓
Asteraceae	<i>Rhodanthe pygmaea</i>	Pigmy Sunray	N	✓	✓
Asteraceae	<i>Rhodanthe stuartiana</i>	-	N	-	✓
Asteraceae	<i>Vittadinia cuneata</i>	Daisy	N	✓	✓
Asteraceae	-	Cudweed sp. 1	E	✓	-
Boraginaceae	<i>Heliotropium curassavicum</i>	Smooth Heliotrope	E	✓	-
Boraginaceae	<i>Calotis sp. 3 (Omphalolappula concava?)</i>	-	N	-	✓
Brassicaceae	<i>Alyssum linifolium</i>	Flax-leaf Alyssum	E	✓	✓
Brassicaceae	<i>Carrichtera annua</i>	Wards weed	HTE	✓	✓
Brassicaceae	<i>Harmsiodoxa blennodioides</i>	-	N	-	✓
Brassicaceae	<i>Lepidium spp.</i>	-	N	-	✓
Brassicaceae	<i>Sisymbrium spp.</i>	Rocket, Mustard	E	✓	✓
Brassicaceae	<i>Stenopetalum lineare</i>	Threadcress	N	-	✓
Casuarinaceae	<i>Casuarina pauper</i>	Black Oak, Belah	N	✓	✓
Chenopodiaceae	<i>Atriplex angulata</i>	-	N	-	✓
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	N	✓	✓

Family name	Scientific name	Common name	Native, Exotic, High Threat Exotic	Study Area 1	Study Areas 2+3
Chenopodiaceae	<i>Atriplex sp. 1</i>	-	N	✓	✓
Chenopodiaceae	<i>Atriplex spongios</i>	Pop Saltbush	N	✓	✓
Chenopodiaceae	<i>Atriplex vesicaria</i>	Bladder Saltbush	N	✓	-
Chenopodiaceae	<i>Chenopodium cristatum</i> (<i>Dysphania cristata</i>)	Crested Crumbweed	N	✓	-
Chenopodiaceae	<i>Dissocarpus paradoxus</i>	Cannonball Burr	N	✓	✓
Chenopodiaceae	<i>Enchylaena tomentosa</i>	Ruby Saltbush	N	✓	✓
Chenopodiaceae	<i>Maireana georgei</i>	Slit-wing Bluebush	N	✓	✓
Chenopodiaceae	<i>Maireana pyramidata</i>	Black Bluebush	N	✓	✓
Chenopodiaceae	<i>Maireana sclerolaenoides</i>	Wolly-fruited Copperburr	N	-	✓
Chenopodiaceae	<i>Maireana sedifolia</i>	Pearl Bluebush	N	✓	✓
Chenopodiaceae	<i>Maireana sp. 5</i>	-	N	-	✓
Chenopodiaceae	<i>Maireana trichoptera</i>	Pink-seeded Bluebush	N	✓	✓
Chenopodiaceae	<i>Maireana triptera</i>	Three-wing Bluebush	N	-	✓
Chenopodiaceae	<i>Maireana turbinata</i>	Satiny Bluebush	N	✓	✓
Chenopodiaceae	<i>Salsola australis</i>	Roly-poly	N	-	✓
Chenopodiaceae	<i>Sclerolaena bicornis</i>	Goathead Burr	N	✓	✓
Chenopodiaceae	<i>Sclerolaena birchii</i>	Galvanized Burr	N	✓	-
Chenopodiaceae	<i>Sclerolaena muricata</i>	Black Roly-poly	N	✓	-
Chenopodiaceae	<i>Sclerolaena obliquicuspis</i>	Limestone Copperburr	N	✓	✓
Chenopodiaceae	<i>Sclerolaena patentiscuspis</i>	Spear-fruit Copperburr	N	✓	✓
Convolvulaceae	<i>Convolvulus clementii</i>	Desert Bindweed	N	✓	-
Fabaceae	<i>Acacia brachystachya</i>	Umbrella Mulga	N	-	✓
Fabaceae	<i>Acacia colletioides</i>	Wait-a-while	N	-	✓
Fabaceae	<i>Medicago sp. 1</i>	Medic Burr	E	✓	✓
Fabaceae	<i>Medicago sp. 2</i>	Medic Burr	E	✓	✓
Fabaceae	<i>Senna artemisioides</i>	Cassia	N	✓	-
Geraniaceae	<i>Erodium carolinianum</i>	Blue Crowfoot	N	✓	✓
Geraniaceae	<i>Erodium cicutarium</i>	Common Crowfoot	E	✓	-
Goodeniaceae	<i>Goodenia fascicularis</i>	Goodenia	N	✓	✓
Goodeniaceae	<i>Goodenia pinnatifida</i>	Goodenia	N	✓	-
Lamiaceae	<i>Salvia verbenaca</i>	Wild Sage, Vervain	E	✓	-
Loranthaceae	<i>Lysiana sp. 1</i>	Mistletoe sp. 1 (on Western Rosewood)	N	-	✓

Family name	Scientific name	Common name	Native, Exotic, High Threat Exotic	Study Area 1	Study Areas 2+3
Malvaceae	<i>Abutilon sp. 1</i>	-	N	✓	-
Malvaceae	<i>Sida corrugata</i>	Corrugated Sida	N	✓	-
Malvaceae	<i>Sida intricata</i>	Twiggy Sida	N	✓	✓
Malvaceae	<i>Sida spodochroma/corrugata</i>	Limestone Sida	N	✓	-
Poaceae	<i>Austrostipa nitida</i>	-	N	✓	✓
Poaceae	<i>Austrostipa nodosa</i>	-	N	✓	✓
Poaceae	<i>Austrostipa spp.</i>	-	N	✓	✓
Poaceae	<i>Enneapogon avenaceus</i>	Bottle Washers	N	✓	-
Poaceae	<i>Eragrostis sp. 1</i> (Roger Lembit taken sample)	-	N?	✓	-
Poaceae	<i>Poa fax</i>	Scaly Poa	N	✓	✓
Poaceae	<i>Rostraria pumila</i>	Roughtail	E	✓	-
Poaceae		Grass sp. 6	N?	✓	-
Rutaceae	<i>Geijera parviflora</i>	Wilga	N	-	✓
Santalaceae	<i>Exocarpos aphyllus</i>	Leafless Ballart	N	-	✓
Sapindaceae	<i>Alectryon oleifolius subsp. canescens</i>	Western Rosewood	N	✓	✓
Sapindaceae	<i>Dodonaea viscosa subsp. angustissima</i>	Narrow-leaved Hopbush	N	✓	-
Scrophulariaceae	<i>Eremophila sturtii</i>	Turpentine Bush	N	-	✓
Solanaceae	<i>Nicotiana spp.</i>	-	N	-	✓
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	E	✓	-
Zygophyllaceae	<i>Zygophyllum ammophila</i>	Sand Twinleaf	N	✓	✓
Zygophyllaceae	<i>Zygophyllum crenatum</i>	Lobed Twinleaf	N	✓	✓
Zygophyllaceae	<i>Zygophyllum ovatum</i>	Dwarf Twinleaf	N	-	✓

Note: Species to be confirmed are highlighted red.

Table 10-7: Fauna Species Located Within the Study Areas

Scientific name	Common name	NSW status ¹	Commonwealth status	Observation type	Study Area 1	Study Areas 2+3
Amphibians						
<i>None found</i>	None found	-	-	-	-	-
Reptiles						
<i>Pogona vitticeps</i>	Central Bearded Dragon	P	-	Sighted	✓	✓
<i>Cryptoblepharus australis</i>	Inland Snake-eyed Skink	P	-	Sighted	✓	-
<i>Ctenotus olympicus</i>	Ctenotus olympicus	P	-	Pitfall/reptile funnel, sighted	✓	✓
<i>Ctenotus regius</i>	Pale-rumped Ctenotus	P	-	Pitfall/reptile funnel	✓	-
<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus	P	-	Pitfall/reptile funnel, sighted	✓	✓
<i>Diplodactylus furcosus</i>	Ranges Stone Gecko	P	-	Pitfall/reptile funnel, spotlight	✓	-
<i>Gehyra versicolor</i>	Tree Dtella	P	-	Pitfall/reptile funnel	✓	-
<i>Heteronotia binoei</i>	Bynoe's Gecko	P	-	Pitfall/reptile funnel	✓	-
<i>Lerista punctatovittata</i>	Eastern Robust Slider	P	-	Pitfall	✓	-
<i>Lucasium damaeum</i>	Beaded Gecko	P	-	Pitfall/reptile funnel	✓	-
<i>Menetia greyii</i>	Common Dwarf Skink	P	-	Sighted	-	✓
<i>Pygopus schraderi</i>	Eastern Hooded Scaly-foot	P	-	Reptile funnel, spotlight	✓	-
<i>Rhynchoedura angusta</i>	Border Beaked Gecko	P	-	Pitfall/reptile funnel	✓	-
<i>Tiliqua rugosa</i>	Shingleback	P	-	Sighted	✓	✓
Birds						
<i>Cracticus tibicen</i>	Australian Magpie	P	-	Sighted	✓	✓
<i>Anthus novaeseelandiae</i>	Australian Pipit	P	-	Sighted	✓	✓
<i>Corvus coronoides</i>	Australian Raven	P	-	Sighted	-	✓
<i>Barnardius zonarius</i>	Australian Ringneck	P	-	Sighted	-	✓
<i>Milvus migrans</i>	Black Kite	P	-	Sighted	✓	-
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	P	-	Sighted	-	✓
<i>Northiella haematogaster</i>	Blue Bonnet	P	-	Sighted	✓	✓
<i>Falco berigora</i>	Brown Falcon	P	-	Sighted	✓	-
<i>Climacteris picumnus</i>	Brown Treecreeper	P	-	Sighted	-	✓

Scientific name	Common name	NSW status ¹	Commonwealth status	Observation type	Study Area 1	Study Areas 2+3
<i>Pomatostomus ruficeps</i>	Chestnut-crowned Babbler	P	-	Sighted	✓	-
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	P	-	Sighted	✓	✓
<i>Ocyphaps lophotes</i>	Crested Pigeon	P	-	Sighted	✓	-
<i>Epthianura tricolor</i>	Crimson Chat	P	-	Sighted	✓	-
<i>Dromaius novaehollandiae</i>	Emu	P	-	Sighted	-	✓
<i>Eolophus roseicapillus</i>	Galah	P	-	Sighted	✓	-
<i>Cracticus torquatus</i>	Grey Butcherbird	P	-	Sighted	-	✓
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	P	-	Sighted	-	✓
<i>Hieraetus morphnoides</i>	Little Eagle	V	-	Sighted	-	✓
<i>Corvus mellori</i>	Little Raven	P	-	Sighted	✓	✓
<i>Grallina cyanoleuca</i>	Magpie-lark	P	-	Sighted	-	✓
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V	-	Sighted	✓	-
<i>Artamus personatus</i>	Masked Woodswallow	P	-	Sighted	✓	✓
<i>Falco cenchroides</i>	Nankeen Kestrel	P	-	Sighted	✓	-
<i>Epthianura aurifrons</i>	Orange Chat	P	-	Sighted	✓	✓
<i>Anas superciliosa</i>	Pacific Black Duck	P	-	Sighted	✓	-
<i>Cracticus nigrogularis</i>	Pied Butcherbird	P	-	Sighted	-	✓
<i>Petroica goodenovii</i>	Red-capped Robin	P	-	Sighted	✓	-
<i>Gavicalis virescens</i>	Singing Honeyeater	P	-	Sighted	✓	-
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater	P	-	Sighted	-	✓
<i>Petrochelidon nigricans</i>	Tree Martin	P	-	Sighted	✓	✓
<i>Aquila audax</i>	Wedge-tailed Eagle	P	-	Sighted	✓	✓
<i>Haliastur sphenurus</i>	Whistling Kite	P	-	Sighted	-	✓
<i>Artamus superciliosus</i>	White-browed Woodswallow	P	-	Sighted	✓	✓
<i>Malurus leucopterus</i>	White-winged Fairy-wren	P	-	Sighted	✓	-
<i>Lalage sueurii</i>	White-winged Triller	P	-	Sighted	✓	-
<i>Rhipidura leucophrys</i>	Willie Wagtail	P	-	Sighted	-	✓

Scientific name	Common name	NSW status ¹	Commonwealth status	Observation type	Study Area 1	Study Areas 2+3
<i>Manorina flavigula</i>	Yellow-throated Miner	P	-	Sighted	✓	✓
Mammals						
<i>Sminthopsis murina</i>	Common Dunnart	P	-	Spotlighted	✓	-
<i>Macropus robustus</i>	Common Wallaroo (Euro)	P	-	Sighted	-	✓
<i>Felis catus</i>	Cat	U	-	Sighted (dead)	-	✓
<i>Capra hircus</i>	Goat	U	-	Sighted	✓	✓
<i>Vulpes vulpes</i>	Fox	U	-	Scat	✓	-
<i>Mus musculus</i>	House Mouse	U	-	Pitfall	✓	-
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	P	-	Spotlighted	✓	-
<i>Oryctolagus cuniculus</i>	Rabbit	U	-	Scat	-	✓
<i>Macropus rufus</i>	Red Kangaroo	P	-	Sighted	✓	✓
<i>Ovis aries</i>	Sheep (stock)	U	-	Sighted	✓	-
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	P	-	Scat	-	✓
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	P	-	Sighted	✓	✓

Note: Threatened species are highlighted blue.

¹ Species status (current as at November 2019). P = Protected species, V = Vulnerable species, U = Introduced species.