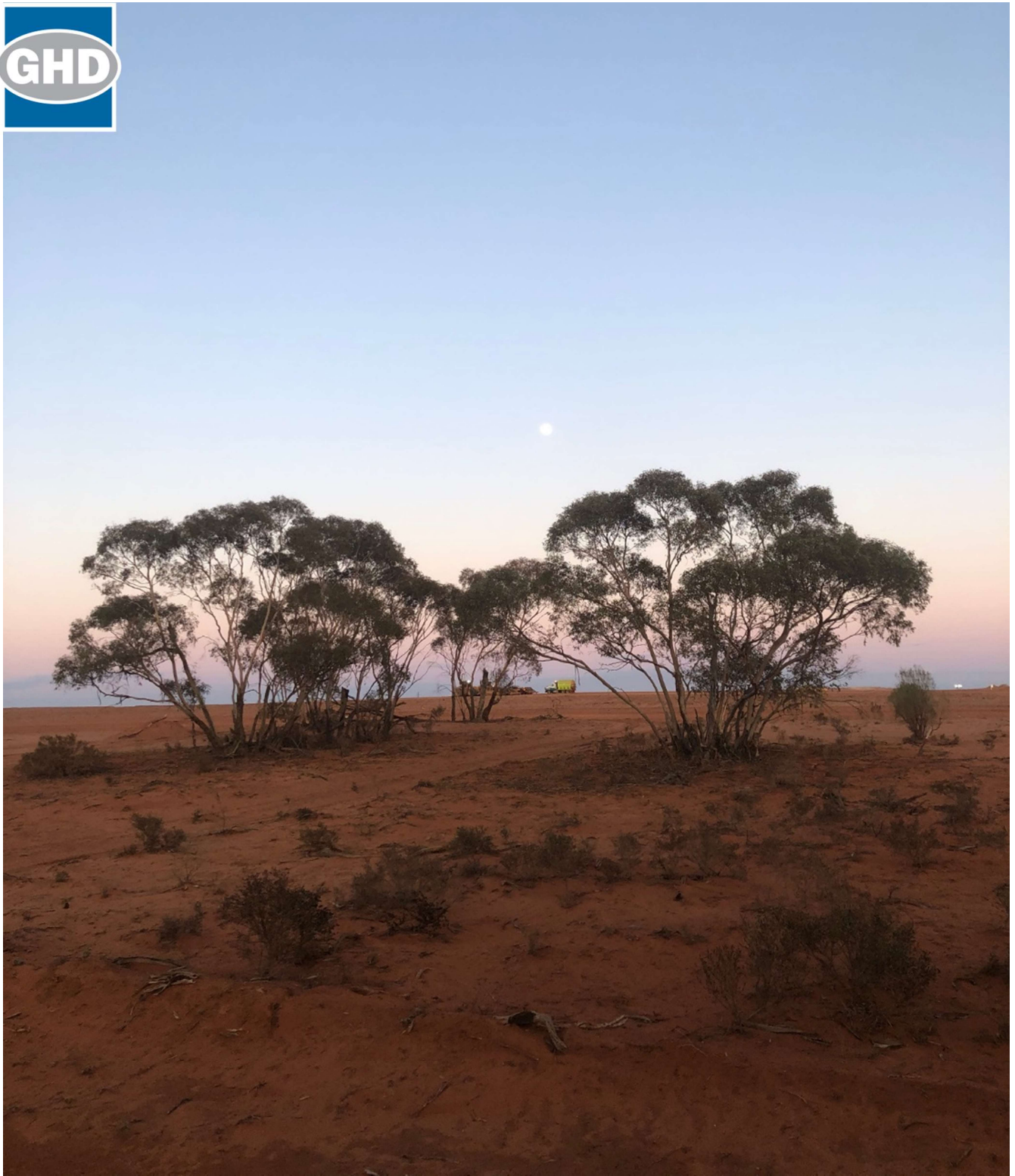




Tronox Mining Australia

Ginkgo and Crayfish Pre-clearance

March 2020

April 2020

Cristal Mining Australia Ltd became Tronox Mining Australia in March 2019. References to Cristal Mining Australia (Cristal) throughout this and previous reports should be viewed as reference to Tronox Mining Australia.

Executive summary

Pre-clearance and clearance salvage fauna activities were completed in areas of remnant vegetation designated for development associated with Tronox Mining Australia's existing Murray Basin Mines; Ginkgo and Crayfish (approximately 30 km west of Pooncarie) in March 2020. The activities were conducted as a part of a strategy to mitigate the impacts to fauna during vegetation removal activities. This is in-line with the current Murray Basin Mines Flora and Fauna Management Plan (GHD 2018).

All trees within the proposed clearing area were assessed and designated for further detailed inspection if found to contain potential wildlife habitat (e.g. hollows or nests). A total of 384 trees at the Ginkgo and Crayfish study sites were inspected in detail for fauna before the broader area of remnant vegetation was cleared.

Three vegetation communities that are dominant within the landscape were cleared across the Study Areas; Belah-Rosewood Woodland, Treeless Chenopod Shrubland and Chenopod Sandplain Mallee Woodland, with a number of smaller localised communities including grass/herbland in scattered gilgai depressions. The clearance area was entirely remnant intact native vegetation observed to be in varying conditions.

All inspections were conducted by a team of qualified ecologists, with works conducted in accordance with the Murray Basin Mines Flora and Fauna Environmental Management Plan, using techniques summarised in the "Vegetation Clearance Protocol" (GHD 2015) developed for pre-clearance surveys at all Murray Basin Mines. At the study sites a total of 384 trees were identified as potential fauna habitat trees and targeted for detailed inspection for signs of fauna presence. The tree species included Belah (*Casuarina pauper*), Sugarwood (*Myoporum platycarpum*), Red Mallee (*Eucalyptus socialis*), Dumosa Mallee (*E. dumosa*), Oil Mallee (*E. oleosa*), Yorrel (*E. gracilis*), Black Box (*E. largiflorens*), Cattle Bush (*Alectryon oleifolius*) and Stags (dead standing trees).

Thirty eight records of native fauna were made from a total of 384 trees assessed during the pre-clearance phase, and 161 records from 42 species of native fauna were made from a much larger number of trees and incidental observations during the chaining of the vegetation. Of the trees identified and checked during pre-clearance at the Study Areas, 35 of the trees, or 9.1% of trees contained fauna.

Overall fauna captures and observation were dominated by four reptile species, Jewelled Gecko (*Strophurus elderii*) (n=23), Tree Dtella (*Gehyra versicolor*) (n=13), Grey's Skink (*Menetia greyii*) (n=13), Boulenger's Skink (*Morethia boulengeri*) (n=10) and one bird species, Chestnut-rumped Thornbill (*Acanthiza uropygialis*) (n=11). Four species listed under the NSW BC Act were recorded during the pre-clearance activities: Jewelled Gecko (*Strophurus elderii*), Marble-faced Delma (*Delma australis*), Little Pied Bat (*Chalinolobus picatus*) and Major Mitchell's Cockatoo (*Cacatua leadbeateri*). Given that suitable surrounding habitat was available for these species and that cleared habitat was of moderate quality, it is unlikely that the clearance activities will have a significant impact on these listed species. There were no species listed under the Federal EPBC Act recorded during pre-clearance activities. All other species captured or observed were common species of surrounding habitat and all were recorded in relatively low numbers (< 10 individuals).

The 2020 Ginkgo and Crayfish Mine fauna pre-clearance surveys and vegetation clearance activities were completed within the preferred February – May survey window (Sluiter and Robertson, 2010; Spence-Bailey, 2010) and between 1st February and May 31st as required in the Murray Basin Mines Flora and Fauna EMP (GHD 2018) which minimises interference with breeding bat and bird species and maximises reptile activity. Future pre-clearance activities should continue

to be completed within this period, although days where temperatures exceed 35°C should be avoided due to the potential for heat stress on captured animals.

Abbreviations

Abbreviation	Full Title
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
Cristal	Cristal Mining Australia Ltd – now Tronox Mining Australia
DA	Development Application
DECC	NSW Department of Environment and Climate Change (formerly DECCW)
DECCW	NSW Department of Environment, Climate Change and Water (changed to DECC now part of OEH)
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMP	Tronox Murray Basin Mines Environmental Management Plan
EPA	NSW Environment Protection Authority (part of the OEH)
EPBC Act	Federal <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFMP	Murray Basin Mines Flora and Fauna Management Plan
GHD	GHD Pty Ltd
MOP	Mining Operations Plan
MLA	Mining Lease Area
OEH	NSW Office of Environment and Heritage
Tronox	Tronox Mining Australia

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Appendices

Appendix A – All fauna recorded during pre-clearance and vegetation clearing, March 2020

Appendix B – Detail of Vegetation Clearing Protocol used during 2020 pre-clearance inspections

1. Introduction

Tronox Mining Australia (Tronox) currently operates three mineral sands mines in the Murray Basin of southwest New South Wales; Ginkgo, Snapper and Crayfish, and have approval for the commencement of two new mines, Atlas and Campaspe, at Boree Plains Station approximately 120 km south east of the existing mines (Figure 1). Tronox also operates a Mineral Separation Plant (MSP) in Broken Hill, which processes the mineral sands concentrates from the mining operations.

As part of the expansion of the existing surface development area and exploration of deposits mines in the Murray Basin, seven areas of proposed clearance were identified:

- Approximately 29 ha at Ginkgo Mine
- Six areas of varying size at Crayfish Mine (approximately 35.35 ha in total)

These proposed clearance areas were designated for pre-clearance activities and vegetation clearance during March 2020.

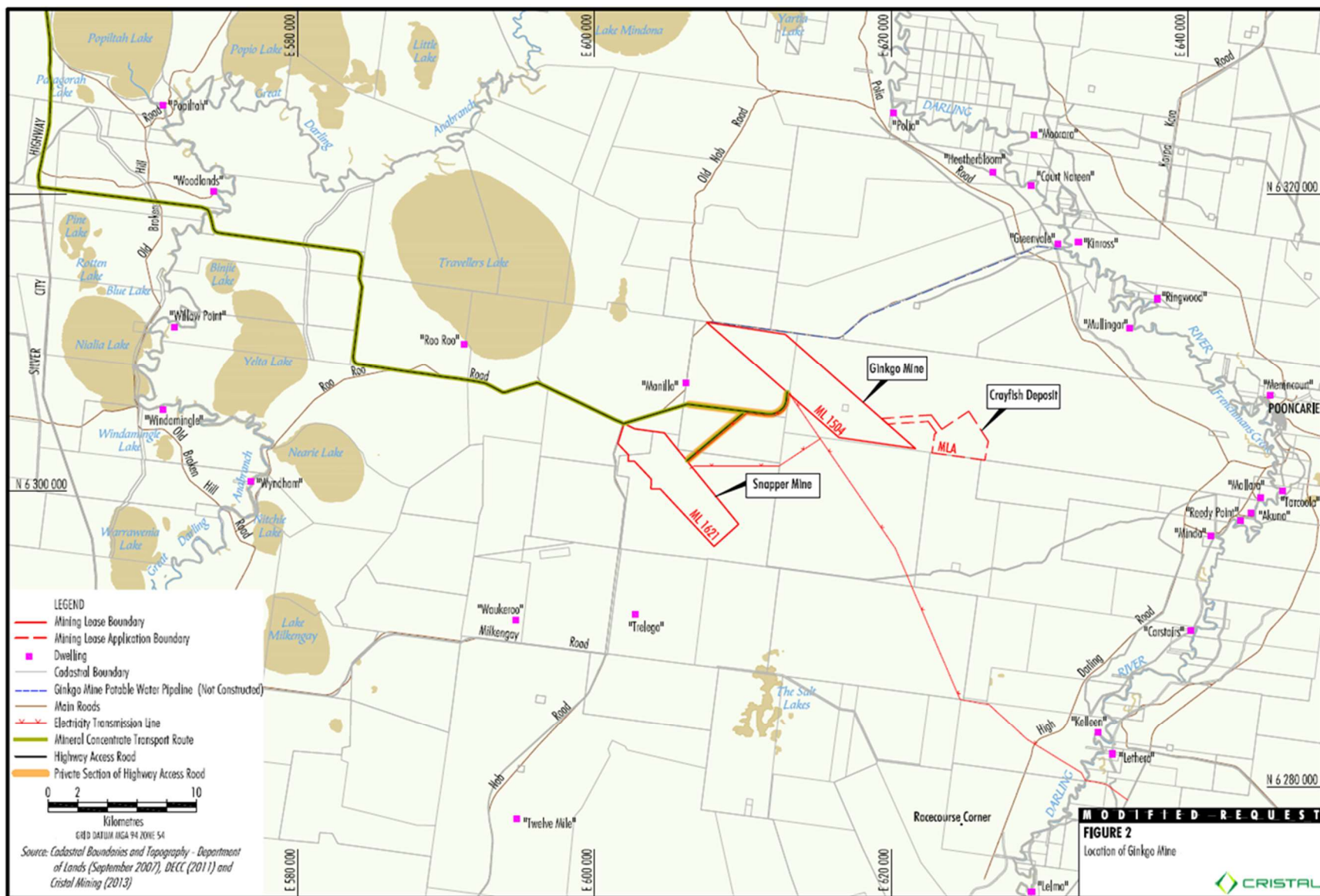
As part of the Murray Basin Mines Flora and Fauna Environmental Management Plan (FFEMP) (GHD 2018) for the Snapper, Ginkgo and Crayfish mines, a “Vegetation Clearance Protocol” (Figure 2) was developed to guide the operator of the mine in any works that involve the clearance of remnant vegetation. Tronox commissioned GHD Pty Ltd (GHD) to complete the fauna pre-clearance surveys of this area in March 2020.

Three broad vegetation types were identified within the approximately 64.35 ha clearance area. At the Ginkgo Mine, Sandplain Chenopod Mallee, Belah Rosewood Woodland dominated the area, while at Crayfish Mine the habitat was broadly defined as Sandplain Chenopod Mallee and Dune Mallee Woodlands.

Habitat descriptions incorporating these vegetation types have been included in Section 3 ‘Study Area’. All fauna observed during pre-clearance surveys and chaining activity were identified, with animals that were captured later released in similar habitat in accordance with the protocols outlined in GHD 2018 (Appendix B).

All wildlife surveys and pre-clearance activities undertaken at the Ginkgo MLA and Crayfish MLA were performed pursuant to the New South Wales National Parks and Wildlife Act, 1974 Scientific Licence number SL 100146.

Figure 1 Tronox operations, Only Ginkgo and Crayfish localities relevant to this report



2. Methods

Fauna pre-clearance assessments were completed from the 10th-26th of March 2020 over a total pre-clearance survey area of approximately 64.35 hectares across the two sites (see Table 1). All pre-clearance inspections were conducted in accordance with the updated Vegetation Clearance Protocol (GHD 2018), summarised below, and provided in detail in Appendix B.

Pre clearance activities involved a team of two ecologists working for four days of habitat tree mark-up and nine days of tree pre-clearance, hollow checking and fauna salvage during non-habitat tree clearing.

2.1 Vegetation clearance protocol

A fully updated and revised Vegetation Clearance Protocol was developed in 2015 to minimise the impact of vegetation clearance activities at Murray Basin mines on flora and fauna, and in particular threatened species (GHD 2018) (see Figure 2). The protocol is provided in its entirety as a single document in Appendix B, suitable for implementation in the field.

The Vegetation Clearance Protocol is applicable to all native species of flora and fauna, and is focused primarily on threatened species, being those listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and NSW *Biodiversity Conservation Act 2016* (BC Act).

The key components of the protocol are:

- Delineation of areas to be cleared of native remnant vegetation
- Pre-clearance targeted surveys for threatened flora and fauna:
 - Targeted threatened flora surveys and mitigation measures (**Protocol 1**)
 - Targeted threatened fauna surveys and mitigation measures:
 - Hollow bearing and large old tree dependent fauna (**Protocol 3**)
- Vegetation Clearing Protocol (**Protocol 4**)
- Fauna management strategies
- Vegetation clearance
- Threatened Species Management Protocol
- Monitoring

Information obtained throughout each stage of the Protocol will contribute to the rehabilitation program for the mines.

Cristal Vegetation Clearance Protocols Requirements

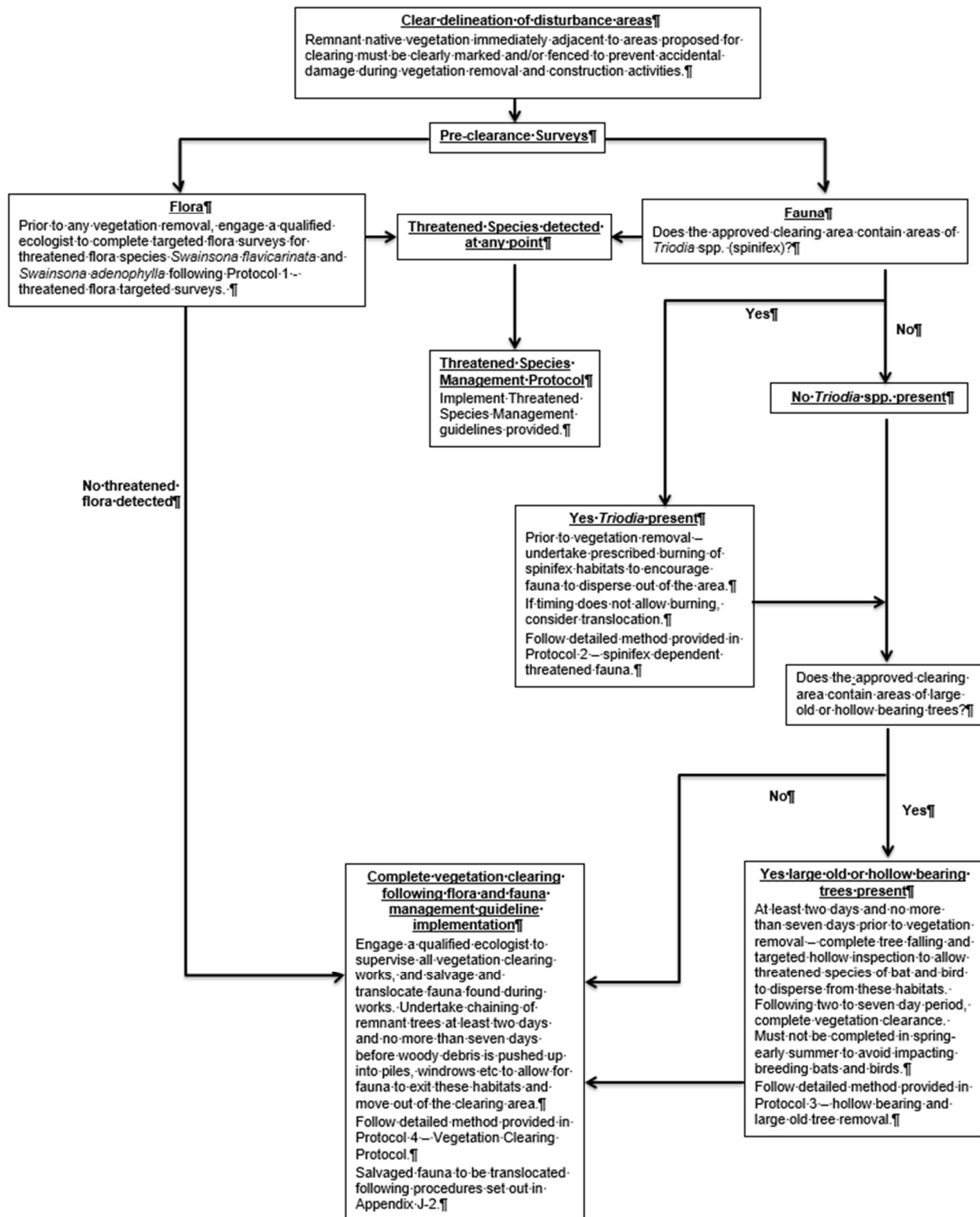


Figure 2 Vegetation Clearance Protocol from GHD 2018

2.2 Pre-clearance surveys

2.2.1 Minimising unnecessary clearance of native vegetation through delineation of disturbance areas

This stage of the protocol involves the delineation of areas to be cleared of native remnant vegetation and aims to avoid any unnecessary or unauthorised clearing of native vegetation. The boundary between the proposed clearance area and remnant native vegetation immediately adjoining proposed clearance areas was clearly marked with flagging tape by Tronox to prevent accidental damage during vegetation removal activities and construction works.

2.2.2 Pre-clearance surveys for flora and fauna

Protocol 1 - Targeted threatened flora surveys

Targeted surveys for threatened flora species Violet Swainson-Pea (*Swainsona adenophylla*) and Yellow-Keeled Swainsona (*Swainsona flavicarinata*) were a requirement of the approval for Ginkgo and Crayfish MLA. Although these species appear in the conditions, neither species has been detected in the area and suitable habitat for both species is not present in the clearance area. *S. adenophylla* in particular is considered highly unlikely to occur in the area, with just one previous record from anywhere in NSW. For these reasons, targeted flora surveys were not undertaken in detail, however ecologists undertaking preclearance were aware of these species and were watchful for their presence.

Protocol 3a - Hollow bearing and large old tree dependent fauna – tree marking

A number of threatened fauna species which are reliant on large, old and hollow-bearing trees either as refuge or for breeding purposes, are likely to occur in the vegetation clearing areas. Large old trees provide critical habitat in the form of hollows, deep cracks and crevices, and accumulations of loose bark, which are used as roosting and breeding sites for a range of species of native microchiropteran bats, and birds. The size of tree, typically measured as diameter at breast height (DBH), at which hollows, cracks and crevices are likely to form, varies greatly between tree species, but is likely in mallee eucalypts over 15cm DBH, Black Box (*Eucalyptus largiflorens*) over 40cm DBH, and Belah (*Casuarina pauper*) over 40cm DBH (taken from Victorian EVC benchmarks for 'large old trees' in neighbouring Murray Mallee bioregion, part of the same Murray Darling Depression IBRA region). Additionally, a small sample of trees below the above mentioned DBH's containing suitable hollows, and any dead Belah containing hollows, were also identified and assessed thoroughly during pre-clearance.

This protocol aims to minimise direct impacts and mortality to threatened fauna species including: Little Pied Bat (*Chalinolobus picatus*), Inland Forest Bat (*Vespadelus baverstocki*), Corben's Long-eared Bat (*Nyctophilus corbeni*) and Major Mitchell's Cockatoo, (*Lophochroa leadbeateri*), by removing key habitat features and encouraging their dispersal out of the development area.

Hollow bearing and large old tree identification and marking was completed over nine person-days, conducted following the guidelines of the Murray Basin Mines FFEMP (GHD 2018) as outlined in the vegetation clearance protocol, summarised here and provided in full in Appendix B

The survey involved an assessment of possible fauna habitat across the proposed areas for preclearance, with information collected on a number of parameters including:

- Vegetation community type.
- Vegetation structure.

- Tree density.
- Presence of key habitats, e.g. hollow-bearing trees.

Habitat trees were identified based upon the presence of attributes such as hollows, large cracks in tree trunks, nests and loose bark. GPS coordinates of all habitat trees were recorded and trees were marked for further pre-clearance assessments where needed. All habitat trees were then characterized by:

- Species and height.
- Number of stems at BH (breast height).
- DBH (diameter at breast height).
- Status of the tree (Alive/Dead).
- Hollow count and size class.
- Presence of cracks.

Protocol 3b - Hollow bearing and large old tree dependent fauna – Tree pre-clearance and hollow checking

Hollow bearing and large old tree dependent fauna pre-clearance and hollow checking was completed over approximately ten person days. Trees identified and marked as habitat and large old trees were fallen individually using a chainsaw and/or pushed with a loader. Following heavy knocking and tapping to disperse mobile species, trees were generally broken up using a loader, and where necessary a chainsaw and hand tools, to allow all hollows to be thoroughly checked for bats, birds and reptiles. Once fallen, these trees are unlikely to provide suitable habitat for hollow dependent fauna, which it is assumed will disperse into the surrounding remnant vegetation.

During the tree clearing, fauna that does not or is unable to disperse themselves, or is injured was captured and translocated following the translocation protocol outlined in Appendix B.

Protocol 4 - Vegetation clearing – Dozer Clearing

Supervised vegetation clearing by a dozer was completed over approximately eight person days. Following pre-clearance fauna surveys, when prioritised large old and hollow-bearing trees had been fallen and broken up, the clearing of vegetation was completed to lay over all trees and large shrubs. Clearing of vegetation was done at least two days before pushing vegetation into heaps and windrows for storage to provide fauna the opportunity to vacate of their own accord. During the chaining process, any fauna unable to disperse or injured are captured and translocated following the translocation protocol outlined in Appendix B2.

3. Study Area

The Ginkgo and Crayfish Mine site Study Areas occur approximately 85 km north of Mildura and 30 km west of the township of Pooncarie in south west NSW in the Murray-Darling Depression Biogeographic Region (Figure 1). The study sites are located within the Western Local Land Services region.

A summary of the pre-mining environment at the Study Areas (and surrounds) is provided below (Sections 3.1-3.2). A detailed description of the existing environment is presented in the Murray Darling Basin Mine Flora and Fauna Environmental Management Plan (GHD 2018).

Additionally, detailed assessments were undertaken as part of the Development Application including EIS/EA reports which aimed to identifying key environmental value and include the following reports:

- Bemax (2001) Ginkgo Mineral Sands Project, Environmental Impact Assessment, Main Report and Appendices, prepared by Resource Strategies on behalf of Bemax Resources Pty Ltd, September 2001.
- Bemax (2012) Ginkgo Mineral Sands Mine Environmental Assessment, prepared by Resource Strategies on Behalf of Bemax Resources Pty Ltd, 2012. (as part of the Crayfish Modification 9)

A summary of the areas proposed for clearing across the two study sites are detailed in Table 1.

Table 1 Two Study Sites and their approximate areas for pre-clearance activities 2020

Site	Area (ha)	Total area (ha)
Ginkgo	29	29
Crayfish	30	35.35
	3.7	
	1	
	0.65 (Three small areas)	
		64.35

3.1 Ginkgo MLA Ecological Values

3.1.1 Flora

Vegetation Communities

The EIS flora study conducted by Orchid Research and Marianne Porteners Environmental Consulting (2001) described plant communities present within the Ginkgo. During the survey, 11 vegetation communities were identified in Table .

Table 2 Vegetation communities identified within the Ginkgo MLA area by Bower and Porteners 2001.

	Original Community Name	Benson Vegetation Communities Equivalent
1	<i>Casuarina pauper</i> , Belah woodland	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray- Darling Depression (Benson 58)
2	<i>E. largiflorens</i> , Black Box woodland	Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (Benson 15)
3	<i>E. socialis</i> / <i>E. dumosa</i> / <i>E. gracilis</i> , Sandplain/Swale Mallee shrubland	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (Benson 170)
3	<i>E. gracilis</i> / <i>E. dumosa</i> / <i>E. socialis</i> / <i>Triodia scariosa</i> subsp. <i>scariosa</i> , Dune Mallee shrubland	Deep sand mallee of irregular dunefields of the semi-arid (warm) zone (Benson 172)
4	<i>Maireana pyramidata</i> / <i>M. sedifolia</i> shrubland	Pearl Bluebush low open shrubland of the arid and semi- arid plains (Benson 154)
5	<i>Sclerolaena</i> spp., Chenopod Shrublands/ Grasslands - Copperburr low shrubland	Black Roly Poly low open shrubland of the Riverina and Murray-Darling Depression Bioregions (Benson 216)
6	Depression herblands	(Likely to be) Couch Grass grassland wetland on river banks and floodplains of inland river systems (Benson 50)
7	Disturbed herbland/grassland	Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone (Benson 165)
8	<i>Eucalyptus camaldulensis</i> , Riverine Woodland	River Red Gum – Warrego Grass – Couch Grass riparian tall woodland wetland of the semi-arid (warm) climate zone (Benson 8)
9	<i>Muehlenbeckia forulenta</i> , Dry swamp	Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina and Murray Darling Depression Bioregions) (Benson 17)
10	<i>Acacia</i> / <i>Eremophila</i> / <i>Dodonaea</i> , Tall Shrubland	Narrow-leaved Hopbush-Scrub Turpentine-Senna shrubland on semi-arid and arid sandplains and dunes (Benson 143)
11	Cleared/Grazing	(Likely to be) Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW (Benson 166)

Threatened Ecological Communities

No vegetation communities within the study area are listed as threatened under the TSC Act occur in the Ginkgo MLA area according to the survey conducted Orchid Research and Marianne Porteners Environmental Consulting (2001).

Threatened Flora Species

The EIS flora study did not record any threatened flora species listed under the TSC Act¹ or EPBC Act at the study area Orchid Research and Marianne Porteners Environmental Consulting (2001).

3.1.2 Fauna

A baseline fauna survey was conducted by Mount King Ecological Surveys (2001) as part of the Ginkgo EIS and DA approvals. Fauna surveys of Ginkgo MLA area recorded some 117 fauna species (111 native, six introduced species) (Mount King Ecological Surveys 2001).

Fauna Habitats

Mount King Ecological (2001) identified three broad habitat types within the Ginkgo MLA, namely:

- Woodland of Belah, Wilga and Rosewood;
- Shrubland and grassland; and
- Mallee.

Threatened Fauna

Fauna surveys conducted by Mount King Ecological Surveys (2001) at Ginkgo identified 12 threatened fauna species (3 mammals, 7 birds, 1 reptile, 1 amphibian):

- Little Pied Bat (*Chalinolobus picatus*) (vu)
- Inland Forest Bat (*Vespadelus baverstocki*) (vu)
- Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*) (vu)
- Blue-billed Duck (*Oxyura australis*) (vu)
- Freckled Duck (*Stictonetta naevosa*) (vu)
- Grey Falcon (*Falco hypoleucos*) (vu)
- Square-tailed Kite (*Lophoictinia isura*) (vu)
- Major Mitchell's Cockatoo (*Cacatua leadbeateri*) (vu)
- Regent Parrot (*Polytelis anthopeplus*) (VU) (en)
- Barking Owl (*Ninox connivens*) (vu)
- Western Blue-tongued Lizard (*Tiliqua occipitalis*) (vu)
- Painted Burrowing Frog (*Neobatrachus pictus*) (en)

BC Act, 2016– NSW Biodiversity and Conservation Act 2016

EPBC Act, 1999 – Commonwealth Environmental Protection and Biodiversity Conservation Act, 1999

en – Endangered under BC Act

vu – Vulnerable under EPBC Act

VU – Vulnerable under EPBC Act

EN – Endangered under EPBC Act

¹ The *Threatened Species Conservation Act 1995* (TSC Act) repealed by the *Biodiversity Conservation Act 2016* (BC Act) with effect from 25/08/2017

A total of 29 threatened fauna species² (18 mammals, 38 birds and 4 reptiles and 1 amphibian) which are known or considered to occur within the Ginkgo MLA area or surrounding areas by Mount King Ecological Surveys (2001).

² Identified as threatened the *Biodiversity Conservation Act 2016* (BC Act) and/or the EPBC Act

3.2 Crayfish MLA Ecological Values

3.2.1 Flora

FloraSearch conducted a flora survey in the Crayfish Modification study area within the Crayfish Modification Boundary as part of the Ginkgo Mineral Sands Mine- Crayfish Modification EA (Bemax Resources 2012) (see FloraSearch 2012 for further details). A total of 158 vascular plant species were identified in the Crayfish Modification study area (126 native, 23 non-native species).

Vegetation Communities

The EA flora study (FloraSearch 2012) described nine plant communities present within the study area Table 2.

**Table 2 Vegetation communities identified within the Crayfish MLA
FloraSearch (2012)**

Community number	Community Name	Benson class 2006
1	Black Box Woodland	16
2	Black Oak –Rosewood - Wilga Woodland	58/221
3	Black Oak – Pearl Bluebush Woodland	221
4	Chenopod (and Disturbed Chenopod) Mallee Woodland / Shrubland	170
5	Dune Mallee (and Disturbed Dune Mallee) Woodland / Shrubland	171
6	Pearl Bluebush Shrubland	154
7	Austrostipa Grassland	165
8	Turpentine Tall Open Shrubland	23
9	Depression Herbfield	-

Threatened Flora Species and Ecological Communities

No vegetation communities within the study area are listed as threatened under the TSC Act 1995³ or the EPBC Act 1999 according to the survey conducted by FloraSearch (2012).

Threatened Flora Species

The EA flora study did not record any threatened flora species listed under the TSC Act⁴ or EPBC Act at the study area (FloraSearch 2012).

3.2.2 Fauna

A baseline fauna survey was conducted by Biodiversity Monitoring Services (2012) as part of the approvals process for the Crayfish Extension of Ginkgo Mine, and are documented in detail in the EA (Biodiversity Monitoring Services 2012), as part of the Ginkgo Mine Modification EA (Bemax Resources, 2012) (see Biodiversity Monitoring Services 2012 for details). Fauna

³ The *Threatened Species Conservation Act 1995* (TSC Act) repealed by the *Biodiversity Conservation Act 2016* (BC Act) with effect from 25/08/2017

⁴ The *Threatened Species Conservation Act 1995* (TSC Act) repealed by the *Biodiversity Conservation Act 2016* (BC Act) with effect from 25/08/2017

surveys of Crayfish modification area (including the proposed Haul Road) recorded some 95 fauna species (90 native, five introduced species) (Biodiversity Monitoring Services 2012).

Fauna Habitats

Biodiversity Monitoring Services (2012) did not identify broad fauna habitat types within Crayfish Modification Area, rather assessed the Vegetation Communities identified by FloraSearch (2012) and structural integrity of vegetation at survey sites (see section 3.2.1 for Vegetation Communities).

Threatened Fauna

Fauna surveys conducted by Biodiversity Monitoring Services (2012) in the Crayfish Extension Area identified six threatened fauna species listed as Vulnerable or Endangered⁵ (2 mammals, 3 birds, 1 reptile):

- Little Pied Bat (*Chalinolobus picatus*) (vu)
- Inland Forest Bat (*Vespadelus baverstocki*) (vu)
- Little Eagle (*Hieraaetus morphnoides*) (vu)
- Varied Sitella (*Daphoenositta chrysoptera*) (vu)
- Major Mitchell's Cockatoo (*Cacatua leadbeateri*) (vu)
- Marble-faced Delma (*Delma australis*) (en)

en – Endangered

vu – Vulnerable

A total of 29 threatened fauna species⁶ (4 mammals, 16 birds and 9 reptiles) which are known or considered to occur within the Crayfish Modification area or surrounding areas by Biodiversity Monitoring Services (2012).

⁵ Identified as threatened under the *Threatened Species Conservation Act 1995* (TSC Act) repealed by the *Biodiversity Conservation Act 2016* (BC Act) with effect from 25/08/2017

⁶ Identified as threatened under the *Threatened Species Conservation Act 1995* (TSC Act)



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4. Results

A total of 384 trees were assessed during the 2020 pre-clearance surveys at Ginkgo and Crayfish Mines, with 35 trees found to contain fauna (~9% of hollow bearing trees containing fauna) (See Figure 4, Figure 5 and Table 6). In addition, several trees not containing fauna showed evidence of microchiropteran bat activity (guano) and bird activity (feathers or scats) in hollows. A total of 161 individuals of 42 fauna species were recorded during the pre-clearance surveys, with most of these observations made from a larger number of non-habitat trees and incidental observations during pre-clearance and clearance activities.

Overall fauna records were dominated by four reptile species, Jewelled Gecko (*Strophurus elderii*) (n=23) (Plate 1), Tree Dtella (*Gehyra versicolor*) (n=13), Grey's Skink (*Menetia greyii*) (n=13), Boulenger's Skink (*Morethia boulengeri*) (n=10) and one bird species, Chestnut-rumped Thornbill (*Acanthiza uropygialis*) (n=11). Four species listed under the BC Act were recorded during the pre-clearance activities: Jewelled Gecko (*Strophurus elderii*), Marble-faced Delma (*Delma australis*) (Plate 2), Little Pied Bat (*Chalinolobus picatus*) and Major Mitchell's Cockatoo (*Cacatua leadbeateri*). There were no species listed under the EPBC Act recorded during pre-clearance activities. All other species captured or observed were common species of surrounding habitat and all were recorded in relatively low numbers (< 10 individuals).

The remnant vegetation undergoing clearing at the study sites were considered to be in moderate-good condition throughout the area, containing intact remnant native vegetation with few signs of overgrazing. Table 3 shows the broad habitat types within each study site observed during the pre-clearance activities.

A summary of results of all fauna recorded during pre-clearance surveys of habitat trees, dozer clearing and incidental observations at the study sites is provided below in Table 4. A summary of all potential habitat trees were mapped (including details such as fauna recorded and diameter of trees (DBH)) and are described in detail in Appendix A.

Table 3 Two study sites and their broad habitat types identified during pre-clearance activities 2020

Clearing area	Broad habitat type	Comments
Ginkgo	Sandplain Chenopod Mallee, Belah-Rosewood and some grass/herbland in scattered gilgai depressions	Dominated by both communities
Crayfish	Sandplain Chenopod Mallee Woodland, Dune Mallee Woodland	Dominated by both communities

Table 4 Summary of the fauna recorded during pre-clearance surveys at Ginkgo and Crayfish Mines, March 2020.

Scientific Name	Common Name	Status: BC,EPBC	Number recorded
Mammals			
Bat sp.	Unknown Bat Species		1
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		6
<i>Chalinolobus picatus</i>	Little Pied Bat	Vulnerable (NSW)	2
Birds			
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		1
<i>Acanthiza apicalis</i>	Inland Thornbill		2
<i>Acanthiza nana</i>	Yellow Thornbill		1
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		11
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		2
<i>Barnardius zonarius barnardi</i>	Mallee Ringneck		3
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable (NSW)	9
<i>Cacatua roseicapilla</i>	Galah		1
<i>Climacteris picumnus</i>	Brown Treecreeper		1
<i>Colluricincla harmonica</i>	Grey Shrike-thrush		1
<i>Corvus coronoides</i>	Australian Raven		1
<i>Corvus mellori</i>	Little Raven		6
<i>Cracticus torquatus</i>	Grey Butcherbird		1
<i>Gymnorhina tibicen</i>	Australian Magpie		1
<i>Northiella haematogaster</i>	Blue Bonnet		2
<i>Oreoica gutturalis</i>	Crested Bellbird		3
<i>Petroica goodenovii</i>	Red-capped Robin		1
<i>Rhipidura leucophrys</i>	Willie Wagtail		1
<i>Smicrornis brevirostris</i>	Weebil		1
Reptiles			
<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink		2
<i>Cryptoblepharus</i> sp.	Unknown <i>Cryptoblepharus</i>		6
<i>Cryptoblepharus australis</i>	Inland Snake-eyed Skink		2
<i>Ctenophorus fordi</i>	Mallee Dragon		3
<i>Ctenotus regius</i>	Regal Striped Skink		5
<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus		6
<i>Delma australis</i>	Marble-faced Delma	Endangered (NSW)	1
<i>Delma butleri</i>	Butler's Legless Lizard		5
<i>Demansia psammophis</i>	Yellow-faced Whip Snake		1
<i>Diplodactylus vittatus</i>	Wood Gecko		1
<i>Diporiphora nobbi</i>	Nobbi Dragon		3
<i>Gehyra versicolor</i>	Tree Dteila		13

Scientific Name	Common Name	Status: BC,EPBC	Number recorded
<i>Heteronotia binoei</i>	Bynoe's Gecko		3
<i>Lerista punctatovittata</i>	Eastern Robust Slider		1
<i>Lerista timida</i>	Timid Slider		1
<i>Lialis burtonis</i>	Burton's Snake-Lizard		2
<i>Menetia greyii</i>	Grey's Skink		13
<i>Morethia boulengeri</i>	Boulenger's Skink		10
<i>Strophurus elderii</i>	Jewelled Gecko	Vulnerable (NSW)	23
<i>Tiliqua rugosa</i>	Stumpy-tailed Lizard		2
Total = 42 species, 161 individuals			

KEY: Status is the threatened species conservation status as listed under the NSW *Biodiversity Conservation Act 2016* (BC) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC).



Plate 1 A Jewelled Gecko (*Strophurus elderii*) (listed as Vulnerable under the *NSW Biodiversity Conservation Act 2016*) captured within Spinfex (*Triodia* sp.) tussock habitat at Crayfish during clearance activities



Plate 2 A Marble-faced Delma (*Delma australis*) (listed as Endangered under the *NSW Biodiversity Conservation Act 2016*) captured within Spinfex (*Triodia* sp.) tussock habitat at Crayfish during clearance activities

5. Discussion

5.1 Habitat Quality and Characteristics

The remnant vegetation undergoing pre-clearance and chaining at the study sites were considered to be in moderate-good condition throughout the area, containing intact remnant native vegetation with very few signs of overgrazing, and low numbers of exotic animals. The Crayfish clearance area was considered the best condition habitat, dominated by intact Chenopod Sandplain Mallee Woodland and Dune Mallee Woodland habitat, with extensive quality surrounding habitat. The Ginkgo clearance area habitat was considered to be of moderate condition, however it was adjacent to the existing Ginkgo Mine, roads and cleared areas. Therefore, this area was exposed to greater disturbance from mining activities and had less connectivity to nearby habitat.

5.2 Threatened Wildlife Considerations

No EPBC Act listed species were detected during the pre-clearance activities. However, four species listed under the BC Act were recorded: Jewelled Gecko (*Strophurus eldieri*), Marble-faced Delma (*Delma australis*), Little Pied Bat (*Chalinolobus picatus*) and Major Mitchell's Cockatoo (*Cacatua leadbeateri*).

Jewelled Gecko were the most frequently encountered threatened species (n = 23) and were detected within Spinifex (*Triodia* sp.) tussocks during pre-clearance activities and Dozer chaining. Jewelled Gecko are entirely dependent on in-tact Spinifex clumps for shelter and foraging. Only the clearance area at Crayfish contained suitable habitat for this species and all individuals were detected in this area. Jewelled Gecko individuals found during pre-clearance and clearance activities were captured and relocated to suitable Spinifex habitat surrounding the Crayfish clearance area as per the translocation protocol (Appendix B5). Given that suitable surrounding habitat was available for this species and that cleared habitat was of moderate quality, it is unlikely that the clearance activities will have a significant impact on this species.

A single Marble-faced Delma was recorded within Spinifex (*Triodia* sp.) tussocks during Dozer chaining at the Crayfish clearance area. Marble-faced Delma are typically restricted to temperate mallee woodlands or spinifex grasslands. The species usually occupies areas with a sandy substrate but may also utilise cracking red loam soils, but has also recently been recorded in spinifex on rocky hillsides. Within the Crayfish clearance area, Spinifex tussocks and leaf litter provide moderate quality habitat for this species. However, only a single individual was recorded during all pre-clearance and clearance activities and it is likely that this species occurs at relatively low abundance within the Crayfish clearance area and will not be significantly impacted by the clearance. The single individual recorded was captured and relocated to suitable Spinifex habitat surrounding the Crayfish clearance area as per the translocation protocol (Appendix B5).

Two Little Pied Bat were recorded flying out of remaining trees during clearance activities in the Ginkgo clearance area. These individuals were unable to be captured (due to remaining in the air), but it is likely that these individuals relocated to surrounding habitat on their own.

Nine Major Mitchell's Cockatoo were incidentally recorded both within and outside the Crayfish clearance area during pre-clearance and clearance activities. This species inhabits a wide range of treed and treeless inland habitats with access to water. Foraging habitat and potential nesting hollows for Major Mitchell's Cockatoo may have been lost as a result of the clearance activities, however, due to individuals of this species using a broad home range it is unlikely any impacts to this species will be significant.

No threatened species were recorded to be injured or killed during the pre-clearance.

5.3 Timing of Pre-Clearance Surveys

The 2020 Ginkgo and Crayfish fauna pre-clearance surveys and vegetation clearance activities were completed within the preferred February – May survey window (Sluiter and Robertson, 2010; Spence-Bailey, 2010) and between 1st February and May 31st as required in the Murray Basin Mines Flora and Fauna EMP (GHD 2018) which minimises interference with breeding bat and bird species and maximises reptile activity. During this survey, temperatures at times approached and exceeded 35°C, which despite increasing activity of reptiles and bats, had potential to cause heat stress on captured animals. Mitigation measures such as insulated esky coolers with ice blocks were used to reduce heat stress on captured animals. Future pre-clearance activities should continue to be carried out within the February – May period, with days where temperatures exceed 35°C avoided where possible. Previous evidence from Ginkgo pre-clearance surveys (GHD 2017) found inactive bird nests and roosts present during March/April/May, further supporting the preferred autumn period for preclearance and chaining.

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Limitations

This report has been prepared by GHD Pty Ltd (GHD) for Tronox Mining Australia (Tronox) and may only be used and relied on by Tronox for the purpose agreed between GHD and Tronox as outlined in this report.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Tronox which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Appendices

Appendix A – All fauna recorded during pre-clearance and vegetation clearing, February 2019

Key:

DBH Diameter at breast height

6.1.1.1 Habitat tree pre-clearance activities, March 2020.

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
1	301	<i>Myoporum platycarpum</i>	3	31	5	Alive		Y	Y	Y	N	
2	302	<i>Casuarina pauper</i>	3	12	4	Alive			Y	Y	N	
3	303	<i>Casuarina pauper</i>	3	33	6	Alive		Y	Y	Y	Y	Bat scat
4	304	<i>Myoporum platycarpum</i>	3	44	6	Alive	Y			Y	Y	
5	305	<i>Casuarina pauper</i>	1	45	10	Alive	Y	Y	Y	Y	Y	Bat scat
6	306	<i>Casuarina pauper</i>	3	42	6	Alive	Y	Y		Y	Y	
7	307	<i>Casuarina pauper</i>	3	37	10	Alive			Y		Y	<i>Heteronotia binoei</i> x 1
8	308	<i>Casuarina pauper</i>	2	38	12	Alive		Y	Y	Y		
9	309	<i>Casuarina pauper</i>	1	42	10	Alive	Y		Y			
10	310	<i>Alectryon oleifolius</i>	3	40	6	Alive	Y	Y		Y		
11	311	<i>Myoporum platycarpum</i>	1	38	4	Alive	Y	Y		Y		
12	312	<i>Myoporum platycarpum</i>	2	31	5	Alive	Y	Y		Y		
13	313	<i>Myoporum platycarpum</i>	1	42	6	Alive		Y	Y	Y		<i>Gehyra versicolor</i> x 1
14	314	<i>Casuarina pauper</i>	3	30	6	Alive			Y		Y	
15	315	Stag	1	45	10	Dead			Y	Y		Bat scats in crack. <i>Cryptoblepharus</i> sp.x 1
16	316	<i>Myoporum platycarpum</i>	2	45	6	Alive		Y	Y	Y	Y	
17	317	<i>Casuarina pauper</i>	1	39	10	Alive	Y	Y		Y	Y	Bat scats under bark. <i>Cryptoblepharus</i> sp. x 1
18	318	<i>Casuarina pauper</i>	3	38	8	Alive	Y			Y		
19	319	Stag	1	23	10	Dead				Y	Y	

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
20	320	<i>Myoporum platycarpum</i>	1	37	10	Alive	Y			Y	Y	
21	321	Stag	2	25	6	Dead					Y	<i>Gehyra versicolor</i> x 1
22	322	<i>Myoporum platycarpum</i>	2	36	8	Alive			Y	Y	Y	
23	323	<i>Casuarina pauper</i>	2	47	8	Alive		Y		Y	Y	Possum scat
24	324	<i>Myoporum platycarpum</i>	2	38	7	Alive			Y	Y		
25	325	<i>Casuarina pauper</i>	2	27	5	Alive	Y			Y		
26	327	<i>Casuarina pauper</i>	1	22	6	Alive			Y	Y		
27	328	Stag	1	43	8	Dead		Y		Y	Y	
28	329	Stag	1	37	5	Dead		Y	Y	Y		<i>Gehyra versicolor</i> x 1
29	330	Stag	2	36	9	Dead		Y	Y			Bat scat. <i>Ctenotus regius</i> x 1
30	331	<i>Casuarina pauper</i>	2	24	6	Alive			Y			
31	332	<i>Eucalyptus</i> sp.	9	26	5	Alive	Y					
32	333	<i>Eucalyptus</i> sp.	3	25	5	Alive	Y	Y				
33	334	<i>Eucalyptus</i> sp.	3	26	6	Alive	Y					
34	335	<i>Eucalyptus</i> sp.	4	23	3	Alive	Y					
35	336	<i>Eucalyptus</i> sp.	3	17	3	Alive		Y				
36	337	<i>Eucalyptus</i> sp.	5	21	4	Alive	Y		Y			
37	338	<i>Casuarina pauper</i>	1	30	6	Alive		Y	Y	Y		
38	339	<i>Eucalyptus oleosa</i>	8	23	6	Alive	Y	Y	Y			
39	340	<i>Eucalyptus</i> sp.	2	35	6	Alive	Y	Y				
40	341	<i>Eucalyptus</i> sp.	1	29	5	Alive		Y				
41	342	<i>Casuarina pauper</i>	1	37	9	Alive	Y	Y	Y	Y		
42	343	<i>Casuarina pauper</i>	1	27	8	Alive			Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
43	344	<i>Eucalyptus</i> sp.	15	29	7	Alive	Y	Y				<i>Cryptoblepharus</i> sp.x 1
44	345	<i>Eucalyptus</i> sp.	4	21	5	Alive			Y			
45	346	<i>Eucalyptus</i> sp.	8	37	10	Alive	Y	Y	Y			
46	347	<i>Casuarina pauper</i>	1	55	8	Alive	Y					
47	348	<i>Eucalyptus</i> sp.	6	18	4	Alive		Y				
48	349	<i>Eucalyptus</i> sp.	6	17	5	Alive	Y	Y				<i>Morethia boulengeri</i> x 1
49	350	<i>Casuarina pauper</i>	2	47	7	Alive			Y	Y		
50	351	<i>Eucalyptus</i> sp.	2	36	6	Alive	Y	Y				
51	352	<i>Eucalyptus socialis</i>	11	28	8	Alive	Y	Y				
52	353	<i>Eucalyptus oleosa</i>	1	24	6	Alive		Y				
53	354	<i>Eucalyptus socialis</i>	2	22	5	Alive			Y			
54	355	<i>Eucalyptus socialis</i>	2	23	4	Alive	Y	Yg				
55	356	<i>Eucalyptus</i> sp.	5	31	6	Alive	Y	Y	Y			<i>Gehyra versicolor</i> x 1
56	357	<i>Eucalyptus oleosa</i>	1	31	7	Alive		Y	Y			
57	358	<i>Eucalyptus oleosa</i>	5	22	5	Alive		Y	Y			<i>Chalinolobus gouldii</i> x 2. OBS during tree mark up (10/3/20)
58	359	<i>Eucalyptus socialis</i>	12	20	4	Alive	Y					
59	360	<i>Eucalyptus oleosa</i>	5	24	6	Alive		Y				<i>Gehyra versicolor</i> x 1
60	361	<i>Eucalyptus oleosa</i>	2	22	5	Alive		Y	Y			
61	362	<i>Eucalyptus oleosa</i>	12	37	6	Alive		Y	Y			
62	363	<i>Eucalyptus oleosa</i>	4	26	5	Alive			Y			
63	364	<i>Eucalyptus socialis</i>	5	22	4	Alive			Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
64	365	<i>Eucalyptus oleosa</i>	4	17	3	Alive		Y	Y	Y		
65	366	<i>Eucalyptus oleosa</i>	2	24	5	Alive		Y	Y			<i>Cryptoblepharus</i> sp.x 1
66	367	<i>Eucalyptus oleosa</i>	1	15	4	Alive		Y	Y			
67	368	Stag	1	16	3	Dead		Y	Y	Y		Bat scat
68	369	<i>Eucalyptus oleosa</i>	2	15	2	Alive				Y		
69	370	<i>Eucalyptus oleosa</i>	4	18	4	Alive			Y			
70	371	<i>Eucalyptus oleosa</i>	6	23	5	Alive		Y	Y	Y		
71	372	<i>Eucalyptus oleosa</i>	2	18	4	Alive			Y			
72	373	<i>Eucalyptus oleosa</i>	7	23	4	Alive			Y			<i>Chalinolobus gouldii</i> x 1 (10/3/20)
73	374	<i>Eucalyptus oleosa</i>	12	24	5	Alive		Y	Y	Y		
74	375	<i>Eucalyptus oleosa</i>	9	25	7	Alive		Y	Y			Left for chaining
75	376	<i>Eucalyptus oleosa</i>	4	30	6	Alive			Y			Left for chaining
76	377	<i>Eucalyptus oleosa</i>	7	19	5	Alive		Y	Y			Left for chaining
77	378	<i>Eucalyptus oleosa</i>	20+	16	5	Alive		Y	Y			Left for chaining
78	379	<i>Eucalyptus oleosa</i>	2	24	6	Alive		Y	Y			Left for chaining
79	380	<i>Eucalyptus</i> sp.	8	18	6	Alive		Y	Y			Left for chaining
80	381	<i>Eucalyptus</i> sp.	3	25	5	Alive			Y			Left for chaining
81	382	<i>Eucalyptus oleosa</i>	4	26	8	Alive		Y	Y			Left for chaining
82	383	<i>Eucalyptus lagiflorens</i>	4	53	20	Alive				Y		Left for chaining
83	384	<i>Eucalyptus oleosa</i>	9	23	9	Alive	Y	Y	Y			
84	385	<i>Eucalyptus</i> sp.	20+	18	8	Alive	Y	Y				
85	386	<i>Eucalyptus</i> sp.	20 +	23	7	Alive		Y		Y		
86	387	<i>Eucalyptus oleosa</i>	20+	28	7	Alive		Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
87	388	<i>Eucalyptus</i> sp.	3	15	5	Alive			Y	Y		
88	389	<i>Eucalyptus oleosa</i>	3	40	10	Alive	Y	Y	Y			
89	390	<i>Eucalyptus oleosa</i>	6	29	9	Alive			Y			
90	391	<i>Eucalyptus oleosa</i>	15+	19	8	Alive		Y	Y			Bat scat
91	392	<i>Eucalyptus oleosa</i>	4	27	7	Alive		Y				
92	393	<i>Eucalyptus socialis</i>	6+	17	5	Alive			Y	Y		
93	394	<i>Eucalyptus socialis</i>	7	24	6	Alive	Y	Y				
94	395	<i>Eucalyptus oleosa</i>	5	41	5	Alive		Y				
95	396	<i>Eucalyptus oleosa</i>	3	30	6	Alive		Y	Y			
96	397	<i>Eucalyptus oleosa</i>	9	30	7	Alive		Y	Y			
97	398	<i>Eucalyptus oleosa</i>	10+	20	8	Alive		Y	Y			Australian Owlet-nightjar x 1 - Kept for observation
98	399	<i>Eucalyptus</i> sp.	9	27	7	Alive		Y	Y			
99	400	<i>Eucalyptus</i> sp.	6	29	6	Alive		Y				
100	401	<i>Eucalyptus</i> sp.	4	25	7	Alive			Y			
101	402	<i>Eucalyptus</i> sp.	3	21	5	Alive		Y	Y			
102	403	<i>Eucalyptus</i> sp.	3	27	5	Alive			Y			
103	404	<i>Eucalyptus</i> sp.	3	19	5	Alive			Y			
104	405	<i>Eucalyptus</i> sp.	3	19	4	Alive	Y	Y				
105	406	<i>Eucalyptus</i> sp.	2	26	6	Alive		Y				Bat scat
106	407	<i>Eucalyptus oleosa</i>	4	19	4	Alive		Y				<i>Gehyra versicolor</i> x 1
107	408	<i>Eucalyptus oleosa</i>	3	19	4	Alive		Y	Y			
108	409	<i>Eucalyptus socialis</i>	2	27	5	Alive		Y				
109	410	<i>Eucalyptus oleosa</i>	1	28	6	Alive			Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
110	411	<i>Eucalyptus oleosa</i>	3	27	7	Alive	Y					<i>Cryptoblepharus</i> sp.x 2
111	413	<i>Eucalyptus socialis</i>	3	35	6	Alive	Y	Y				<i>Menetia greyii</i> x 1
112	414	<i>Eucalyptus socialis</i>	1	22	6	Alive			Y			
113	415	<i>Eucalyptus socialis</i>	1	17	5	Aive	Y	Y				
114	416	<i>Eucalyptus socialis</i>	4	23	5	Alive		Y				
115	417	<i>Eucalyptus socialis</i>	1	21	7	Alive	Y	Y				
116	418	<i>Eucalyptus socialis</i>	2	24	6	Alive		Y				
117	419	<i>Eucalyptus socialis</i>	4	17	6	Alive		Y	Y			
118	420	<i>Eucalyptus oleosa</i>	2	22	7	Alive			Y			
119	421	<i>Eucalyptus socialis</i>	4	25	6	Alive			Y			
120	422	<i>Eucalyptus</i> sp.	4	17	5	Alive		Y	Y			
121	423	<i>Eucalyptus oleosa</i>	2	20	5	Alive		Y				
122	424	<i>Eucalyptus oleosa</i>	2	20	6	Alive		Y				<i>Gehyra versicolor</i> x 1
123	425	<i>Eucalyptus oleosa</i>	3	24	7	Alive		Y	Y			
124	426	<i>Eucalyptus</i> sp.	1	16	5	Alive		Y				
125	427	<i>Eucalyptus</i> sp.	1	25	6	Alive						
126	428	<i>Eucalyptus</i> sp.	2	25	6	Alive	Y	Y				
127	429	<i>Eucalyptus oleosa</i>	1	25	7	Alive		Y				
128	430	<i>Eucalyptus oleosa</i>	1	22	8	Alive		Y				
129	431	<i>Eucalyptus socialis</i>	2	24	7	Alive	Y	Y				
130	432	<i>Eucalyptus socialis</i>	2	31	8	Alive		Y	Y			
131	433	<i>Eucalyptus</i> sp.	4	19	4	Alive			Y			
132	434	<i>Eucalyptus</i> sp.	1	35	8	Alive	Y	Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
133	435	<i>Eucalyptus</i> sp.	2	26	8	Alive	Y					<i>Cryptoblepharus</i> sp.x 1
134	436	<i>Eucalyptus socialis</i>	2	33	9	Alive	Y	Y				
135	437	<i>Eucalyptus socialis</i>	5	27	10	Alive		Y				
136	438	<i>Eucalyptus socialis</i>	3	30	8	Alive	Y	Y				
137	439	<i>Eucalyptus socialis</i>	1	23	8	Alive			Y			
138	440	<i>Eucalyptus oleosa</i>	3	30	9	Alive	Y		Y			<i>Tiliqua rugosa</i> x 1 - Kept for observation
139	441	<i>Eucalyptus oleosa</i>	3	18	5	Stag		Y	Y			<i>Gehyra versicolor</i> x 1
140	442	<i>Eucalyptus oleosa</i>	5	30	7	Alive		Y	Y			
141	443	<i>Eucalyptus socialis</i>	3	28	10	Alive		Y	Y			
142	444	<i>Eucalyptus socialis</i>	3	30	7	Alive	Y	Y	Y			
143	445	<i>Eucalyptus</i> sp.	2	25	6	Alive		Y				
144	446	<i>Eucalyptus socialis</i>	3	20	6	Alive		Y	Y			
145	447	<i>Eucalyptus</i> sp.	2	16	7	Alive		Y	Y			
146	448	<i>Eucalyptus socialis</i>	8	27	10	Alive		Y	Y			
147	449	<i>Eucalyptus socialis</i>	2	16	5	Alive		Y				
148	450	<i>Eucalyptus socialis</i>	2	18	6	Alive		Y				
149	451	<i>Eucalyptus oleosa</i>	2	15	6	Alive		Y				
150	452	<i>Eucalyptus socialis</i>	1	22	5	Alive		Y				
151	453	<i>Eucalyptus socialis</i>	2	29	8	Alive		Y				
152	454	<i>Eucalyptus</i> sp.	1	33	10	Alive	Y	Y				
153	455	<i>Eucalyptus socialis</i>	2	36	10	Alive	Y	Y				
Crayfish												

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
154	456	<i>Eucalyptus socialis</i>	3	22	8	Alive		Y				Left for chaining on boundary
155	457	<i>Eucalyptus socialis</i>	3	19	9	Aive	Y	Y				<i>Ctenotus</i> sp. x 1 - Ran under standing limb
156	458	<i>Eucalyptus socialis</i>	6	17	8	Alive		Y	Y			
157	459	<i>Eucalyptus socialis</i>	5	20	12	Alive	Y	Y				
158	460	<i>Eucalyptus socialis</i>	3	40	12	Alive		Y				
159	461	<i>Eucalyptus socialis</i>	2	27	6	Aive		Y				
160	462	<i>Eucalyptus socialis</i>	2	26	13	Alive	Y	Y				<i>Cryptoblepharus</i> sp. x 1
161	463	<i>Eucalyptus socialis</i>	3	19	8	Alive	Y	Y				<i>Chalinolobus gouldii</i> x 1 - Flew out of hollow, under birds nest
162	464	<i>Eucalyptus socialis</i>	4	32	13	Alive		Y				
163	465	<i>Myoporum platycarpum</i>	1	74	15	Aive		Y				
164	466	<i>Eucalyptus socialis</i>	2	32	4	Alive		Y	Y			
165	467	<i>Eucalyptus socialis</i>	2	25	5	Alive		Y	Y			
166	468	<i>Eucalyptus socialis</i>	2	19	9	Alive		Y				Birds nest
167	469	<i>Eucalyptus socialis</i>	2	21	4	Alive		Y	Y			
168	470	<i>Eucalyptus socialis</i>	4	27	16	Alive		Y	Y			
169	471	<i>Eucalyptus socialis</i>	6	18	12	Alive		Y	Y			
170	472	<i>Eucalyptus socialis</i>	2	26	15	Alive		Y	Y			
171	473	<i>Eucalyptus socialis</i>	3	26	16	Alive		Y				
172	474	<i>Eucalyptus socialis</i>	4	19	10	Alive		Y	Y			
173	475	<i>Eucalyptus socialis</i>	2	18	7	Alive		Y				
174	476	<i>Eucalyptus socialis</i>	2	25	7	Alive	Y	Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
175	477	<i>Eucalyptus socialis</i>	2	27	11	Alive		Y	Y			
176	478	<i>Eucalyptus socialis</i>	2	24	7	Alive		Y	Y			
177	479	<i>Eucalyptus socialis</i>	3	17	6	Alive			Y			
178	480	<i>Eucalyptus socialis</i>	1	28	10	Alive	Y	Y				
179	481	<i>Eucalyptus socialis</i>	2	25	9	Alive		Y	Y			<i>Cryptoblepharus</i> sp. x 1. Birds nest
180	482	<i>Eucalyptus socialis</i>	3	19	9	Alive	Y		Y			
181	483	<i>Eucalyptus socialis</i>	1	23	6	Alive			Y			
182	484	<i>Eucalyptus socialis</i>	2	25	8	Alive	Y	Y				
183	485	<i>Eucalyptus socialis</i>	5	17	7	Alive	Y	Y				
184	486	<i>Eucalyptus socialis</i>	1	22	6	Alive		Y				
185	487	<i>Eucalyptus socialis</i>	3	20	6	Alive	Y	Y	Y			
186	488	<i>Eucalyptus socialis</i>	1	21	7	Alive		Y				
187	489	<i>Eucalyptus socialis</i>	3	26	12	Alive	Y	Y				
188	490	<i>Eucalyptus socialis</i>	2	20	5	Alive		Y				
189	491	<i>Eucalyptus socialis</i>	2	31	6	Alive		Y	Y			
190	492	<i>Eucalyptus socialis</i>	3	19	5	Alive			Y			Birds nest
191	493	<i>Eucalyptus socialis</i>	4	26	12	Alive	Y	Y				
192	494	<i>Eucalyptus socialis</i>	1	15	3	Alive		Y				
193	495	<i>Eucalyptus socialis</i>	1	26	6	Alive		Y				
194	496	<i>Eucalyptus socialis</i>	2	23	11	Alive		Y	Y			
195	497	<i>Eucalyptus socialis</i>	2	25	12	Alive		Y				
196	498	<i>Eucalyptus socialis</i>	3	26	9	Alive			Y			
197	499	<i>Eucalyptus socialis</i>	1	18	7	Alive		Y				
198	500	<i>Eucalyptus socialis</i>	2	27	14	Alive		Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
199	501	<i>Eucalyptus socialis</i>	2	15	5	Alive		Y				
200	502	<i>Eucalyptus socialis</i>	1	16	4	Alive		Y				
201	503	<i>Eucalyptus socialis</i>	2	20	4	Alive		Y				
202	504	<i>Eucalyptus socialis</i>	1	20	4	Alive			Y			
203	505	<i>Eucalyptus socialis</i>	3	23	10	Alive		Y				
204	506	<i>Eucalyptus socialis</i>	5	22	7	Alive		Y				
205	507	<i>Eucalyptus socialis</i>	1	16	5	Alive		Y				
206	508	<i>Eucalyptus socialis</i>	1	16	5	Alive		Y				
207	509	<i>Eucalyptus socialis</i>	1	23	6	Alive		Y				
208	510	<i>Eucalyptus socialis</i>	1	19	5	Alive		Y				
209	511	<i>Eucalyptus socialis</i>	1	14	5	Alive		Y				
210	512	<i>Eucalyptus socialis</i>	4	22	6	Alive		Y				
211	513	<i>Eucalyptus socialis</i>	3	17	6	Alive	Y		Y			
212	514	<i>Eucalyptus socialis</i>	1	12	5	Alive		Y				
213	515	<i>Eucalyptus socialis</i>	2	16	8	Alive			Y			
214	516	<i>Eucalyptus socialis</i>	5	13	6	Alive		Y				
215	517	<i>Eucalyptus socialis</i>	2	12	6	Alive						
216	518	<i>Eucalyptus socialis</i>	2	23	6	Alive	Y	Y				
217	519	<i>Eucalyptus socialis</i>	2	29	8	Alive	Y					
218	520	<i>Eucalyptus socialis</i>	1	25	8	Alive	Y	Y	Y			Owls likely used
219	521	<i>Eucalyptus gracilis</i>	1	28	10	Alive		Y	Y			Australian Owlet-nightjar likely used
220	522	<i>Eucalyptus socialis</i>	2	31	8	Alive		Y	Y			
221	523	<i>Eucalyptus gracilis</i>	1	29	8	Alive		Y				
222	524	<i>Eucalyptus socialis</i>	2	21	10	Alive		Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
223	525	<i>Eucalyptus gracilis</i>	3	35	10	Alive	Y	Y				
224	526	<i>Eucalyptus gracilis</i>	1	41	10	Alive		Y	Y			
225	527	<i>Eucalyptus gracilis</i>	3	29	12	Alive	Y	Y	Y			
226	528	<i>Eucalyptus gracilis</i>	2	25	8	Alive		Y	Y			
227	529	<i>Eucalyptus gracilis</i>	3	24	10	Alive	Y	Y	Y			
228	530	<i>Eucalyptus socialis</i>	2	19	7	Alive	Y	Y				
229	531	<i>Eucalyptus socialis</i>	2	30	6	Alive		Y				
230	532	<i>Eucalyptus socialis</i>	1	32	8	Alive	Y	Y				
231	533	<i>Eucalyptus socialis</i>	1	21	8	Alive		Y				
232	534	<i>Eucalyptus socialis</i>	2	27	10	Alive		Y				
233	535	<i>Eucalyptus socialis</i>	1	15	5	Alive		Y				
234	536	<i>Eucalyptus</i> sp.	3	25	6	Alive		Y				
235	537	<i>Eucalyptus</i> sp.	3	24	6	Alive	Y	Y				
236	538	<i>Eucalyptus socialis</i>	2	27	8	Alive	Y	Y				
237	539	<i>Eucalyptus</i> sp.	3	21	6	Alive		Y				
238	540	<i>Eucalyptus socialis</i>	3	32	10	Alive	Y		Y			
239	541	<i>Eucalyptus</i> sp.	3	22	10	Alive		Y				
240	542	<i>Eucalyptus</i> sp.	2	17	10	Alive		Y				
241	543	<i>Eucalyptus</i> sp.	2	18	8	Alive		Y				Australian Owlet-nightjar x 1. Log left for self release
242	544	<i>Eucalyptus</i> sp.	2	15	5	Alive		Y				
243	545	<i>Eucalyptus gracilis</i>	2	13	5	Alive		Y				
244	546	<i>Eucalyptus gracilis</i>	3	19	5	Alive			Y			
245	547	<i>Eucalyptus</i> sp.	4	19	8	Alive	Y	Y				
246	548	<i>Eucalyptus socialis</i>	5	24	8	Alive		Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
247	549	<i>Eucalyptus oleosa</i>	4	18	8	Alive		Y				
248	550	<i>Eucalyptus socialis</i>	3	20	7	Alive		Y				
249	551	<i>Eucalyptus oleosa</i>	2	20	7	Alive		Y	Y			
250	552	<i>Eucalyptus socialis</i>	4	21	9	Alive		Y	Y			
251	553	<i>Eucalyptus oleosa</i>	3	26	14	Alive		Y	Y			
252	554	<i>Eucalyptus</i> sp.	1	20	8	Alive		Y	Y			
253	555	<i>Eucalyptus oleosa</i>	4	36	12	Alive		Y				
254	556	<i>Eucalyptus socialis</i>	2	21	10	Alive			Y			
255	557	<i>Eucalyptus oleosa</i>	3	31	15	Alive		Y				Bat scat
256	558	<i>Eucalyptus oleosa</i>	3	22	8	Alive		Y				
257	559	<i>Eucalyptus</i> sp.	3	17	6	Alive	Y	Y				
258	560	<i>Eucalyptus</i> sp.	1	16	6	Alive		Y				
259	561	<i>Eucalyptus socialis</i>	4	22	6	Alive		Y				<i>Gehyra versicolor</i> x 1.
260	562	Stag	1	27	5	Stag	Y	Y				Australian Owlet-nightjar feathers in hollow
261	563	<i>Eucalyptus oleosa</i>	3	28	8	Alive	Y	Y				
262	564	<i>Eucalyptus socialis</i>	3	22	8	Alive		Y				
263	565	<i>Eucalyptus gracilis</i>	3	19	8	Alive		Y				
264	566	<i>Eucalyptus oleosa</i>	3	19	12	Alive	Y	Y				Stockpile area, can leave
265	567	<i>Eucalyptus socialis</i>	3	42	9	Alive	Y	Y	Y			<i>Gehyra versicolor</i> x 1
266	568	<i>Eucalyptus socialis</i>	2	20	7	Alive		Y	Y			
267	569	<i>Eucalyptus socialis</i>	4	19	8	Alive	Y	Y				
268	570	<i>Eucalyptus gracilis</i>	3	21	9	Alive	Y	Y				

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
269	571	Stag	2	25	8	Stag	Y	Y				
270	572	<i>Eucalyptus socialis</i>	3	16	6	Alive		Y				
271	573	<i>Eucalyptus gracilis</i>	2	30	10	Alive		Y				
272	574	<i>Eucalyptus socialis</i>	2	29	5	Alive		Y				
273	575	<i>Eucalyptus socialis</i>	1	13	3	Alive			Y			
274	576	<i>Eucalyptus</i> sp.	1	15	4	Alive		Y	Y			
275	577	<i>Eucalyptus socialis</i>	1	19	7	Alive		Y				
276	578	<i>Eucalyptus socialis</i>	1	17	3	Alive		Y				Outside boundary, leaving
277	579	<i>Eucalyptus socialis</i>	2	23	6	Alive		Y	Y			
278	580	<i>Eucalyptus socialis</i>	4	32	10	Alive	Y	Y				
279	581	<i>Eucalyptus socialis</i>	3	29	12	Alive		Y				
280	582	<i>Eucalyptus socialis</i>	3	45	15	Alive		Y	Y			
281	583	<i>Eucalyptus socialis</i>	2	31	6	Alive	Y	Y				
282	584	<i>Eucalyptus socialis</i>	1	27	10	Alive	Y	Y				
283	585	<i>Eucalyptus</i> sp.	5	22	16	Alive	Y	Y	Y			
284	586	<i>Eucalyptus socialis</i>	3	21	12	Alive		Y				Bat scats
285	587	<i>Eucalyptus</i> sp.	3	16	5	Alive	Y	Y				
286	588	<i>Eucalyptus socialis</i>	1	24	14	Alive		Y				
287	589	<i>Eucalyptus</i> sp.	1	23	10	Alive		Y				
288	590	<i>Eucalyptus gracilis</i>	2	24	13	Alive	Y	Y				
289	591	<i>Eucalyptus socialis</i>	1	19	9	Alive		Y				<i>Gehyra versicolor</i> x 1
290	592	<i>Eucalyptus</i> sp.	2	20	6	Alive		Y	Y			
291	593	<i>Eucalyptus</i> sp.	1	16	4	Alive		Y				
292	594	<i>Eucalyptus socialis</i>	3	27	9	Alive	Y	Y				

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
293	595	<i>Eucalyptus</i> sp.	1	24	8	Alive		Y	Y			
294	596	<i>Eucalyptus socialis</i>	1	24	7	Alive		Y	Y			
295	597	<i>Eucalyptus socialis</i>	2	22	10	Alive		Y				
296	598	<i>Eucalyptus</i> sp.	1	21	7	Alive		Y				
297	599	<i>Eucalyptus socialis</i>	1	23	6	Alive		Y	Y			
298	600	<i>Eucalyptus socialis</i>	2	31	6	Alive		Y	Y			
299	601	<i>Eucalyptus socialis</i>	1	30	5	Alive		Y				
300	602	<i>Eucalyptus socialis</i>	1	23	8	Alive		Y				
301	603	<i>Eucalyptus</i> sp.	1	14	5	Alive		Y	Y			
302	604	<i>Eucalyptus</i> sp.	2	20	8	Alive		Y				
303	605	<i>Eucalyptus socialis</i>	7	19	13	Alive		Y	Y			
304	606	<i>Eucalyptus socialis</i>	1	18	8	Alive		Y				
305	607	<i>Eucalyptus</i> sp.	2	16	5	Alive			Y			
306	608	<i>Eucalyptus socialis</i>	1	19	6	Alive		Y				
307	609	<i>Eucalyptus</i> sp.	1	25	6	Alive		Y				
308	610	<i>Eucalyptus socialis</i>	2	19	8	Alive		Y				
309	611	<i>Eucalyptus</i> sp.	2	28	5	Alive	Y	Y				
310	612	<i>Eucalyptus</i> sp.	2	16	4	Alive		Y				
311	613	<i>Eucalyptus</i> sp.	3	19	7	Alive		Y				
312	614	<i>Eucalyptus</i> sp.	3	20	8	Alive		Y	Y			
313	615	<i>Eucalyptus</i> sp.	1	21	6	Alive			Y			
314	616	<i>Eucalyptus</i> sp.	3	16	4	Alive		Y				Left for chaining
315	617	<i>Eucalyptus</i> sp.	4	21	9	Alive	Y	Y				<i>Cryptoblepharus</i> sp. x 1
316	618	<i>Eucalyptus socialis</i>	2	36	10	Alive	Y					Owl scats

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
317	619	<i>Eucalyptus</i> sp.	1	21	6	Alive		Y				
318	620	<i>Eucalyptus socialis</i>	5	25	10	Alive		Y	Y			
319	621	<i>Eucalyptus socialis</i>	2	16	8	Alive		Y				
320	622	<i>Eucalyptus socialis</i>	5	20	5	Alive		Y				Outside boundary
321	623	<i>Eucalyptus socialis</i>	5	19	6	Alive		Y				
322	624	<i>Eucalyptus</i> sp.	1	14	5	Alive		Y				
323	625	<i>Eucalyptus socialis</i>	2	17	6	Alive		Y				
324	626	<i>Eucalyptus</i> sp.	1	21	6	Alive		Y				
325	627	<i>Eucalyptus</i> sp.	5	20	8	Alive		Y	Y			
326	628	<i>Eucalyptus</i> sp.	2	27	9	Alive	Y	Y				
327	629	<i>Eucalyptus</i> sp.	1	34	12	Alive	Y	Y				
328	630	<i>Eucalyptus</i> sp.	1	22	8	Alive		Y				Owlet Nightjar x 1. Flew out
329	631	<i>Eucalyptus socialis</i>	3	28	8	Alive		Y				
330	632	<i>Eucalyptus socialis</i>	1	20	7	Alive		Y				
331	633	<i>Eucalyptus socialis</i>	1	26	6	Alive		Y				
332	634	<i>Eucalyptus socialis</i>	2	28	10	Alive		Y	Y			
333	635	<i>Eucalyptus socialis</i>	1	32	6	Alive	Y	Y				
334	636	<i>Eucalyptus</i> sp.	1	18	8	Alive		Y				
335	637	<i>Eucalyptus socialis</i>	1	29	10	Alive		Y	Y			
336	638	<i>Eucalyptus</i> sp.	1	33	8	Alive		Y	Y			
337	639	<i>Eucalyptus socialis</i>	3	21	8	Alive		Y	Y			
338	640	<i>Eucalyptus</i> sp.	2	45	8	Alive	Y	Y	Y			
339	641	<i>Eucalyptus socialis</i>	2	31	10	Alive	Y	Y				
340	642	<i>Eucalyptus socialis</i>	1	16	8	Alive		Y				

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
341	643	<i>Eucalyptus socialis</i>	3	26	10	Alive		Y				
342	644	<i>Eucalyptus</i> sp.	3	52	10	Alive		Y	Y			<i>Cryptoblepharus</i> sp. x 2
343	645	<i>Eucalyptus socialis</i>	3	28	8	Alive	Y	Y				
344	646	<i>Eucalyptus socialis</i>	1	49	8	Alive		Y	Y			
345	647	<i>Eucalyptus socialis</i>	1	38	8	Alive		Y	Y			
346	648	<i>Eucalyptus socialis</i>	3	34	12	Alive		Y	Y			
347	649	<i>Eucalyptus socialis</i>	1	23	8	Alive		Y				
348	650	<i>Eucalyptus socialis</i>	2	40	12	Alive	Y	Y	Y			
349	651	<i>Eucalyptus socialis</i>	1	30	10	Alive	Y	Y				
350	652	<i>Eucalyptus socialis</i>	1	27	10	Alive	Y	Y				<i>Gehyra versicolor</i> x 1
351	653	<i>Eucalyptus socialis</i>	1	30	10	Alive	Y	Y				
352	654	<i>Eucalyptus socialis</i>	1	41	9	Alive	Y	Y	Y			
353	655	<i>Eucalyptus socialis</i>	2	34	5	Alive		Y				
354	656	<i>Eucalyptus socialis</i>	1	34	19	Alive	Y	Y				
355	657	<i>Eucalyptus socialis</i>	1	28	6	Alive		Y	Y			
356	658	<i>Eucalyptus socialis</i>	3	46	12	Alive	Y	Y				
357	659	<i>Eucalyptus socialis</i>	5	28	6	Alive	Y	Y				
358	660	<i>Eucalyptus socialis</i>	1	24	6	Alive		Y	Y			
359	661	<i>Eucalyptus socialis</i>	33	33	10	Alive	Y	Y				Grey Shrike-thrush x 1. Using hollow
360	662	<i>Eucalyptus socialis</i>	2	15	4	Alive		Y				
361	663	<i>Eucalyptus socialis</i>	2	28	6	Alive	Y	Y		Y		
362	665	<i>Eucalyptus socialis</i>	3	30	6	Alive		Y				
363	666	<i>Eucalyptus socialis</i>	1	31	8	Alive		Y	Y			

Habitat Tree Number	GPS WP	Tree Species	No. of stems at DBH	DBH (cm)	Height (m)	Dead/Alive	Large	Medium	Small	Cracks	Loose bark	Comments
364	667	<i>Eucalyptus socialis</i>	2	26	8	Alive		Y				
365	668	<i>Eucalyptus</i> sp.	2	25	6	Alive	Y	Y				
366	669	<i>Eucalyptus socialis</i>	2	25	9	Alive	Y	Y	Y			Owl feathers and scats
367	670	<i>Eucalyptus socialis</i>	1	27	10	Alive		Y				
368	671	<i>Eucalyptus socialis</i>	4	33	8	Alive	Y	Y	Y			
369	672	<i>Eucalyptus socialis</i>	3	23	10	Alive	Y	Y	Y			
370	674	<i>Eucalyptus socialis</i>	1	23	6	Alive		Y	Y			
371	675	<i>Eucalyptus socialis</i>	1	35	6	Alive	Y	Y				
372	676	<i>Eucalyptus socialis</i>	1	47	6	Alive	Y	Y	Y			
373	677	<i>Eucalyptus socialis</i>	1	15	4	Alive			Y			
374	678	<i>Eucalyptus socialis</i>	1	19	4	Alive		Y				
375	679	<i>Eucalyptus socialis</i>	1	15	5	Alive			Y			
376	680	<i>Eucalyptus socialis</i>	2	29	10	Alive		Y				
377	681	<i>Eucalyptus socialis</i>	1	21	5	Alive		Y				
378	682	<i>Eucalyptus socialis</i>	3	16	7	Alive		Y				
379	683	<i>Eucalyptus socialis</i>	1	21	4	Alive		Y	Y			
380	684	<i>Casuarina pauper</i>	5	25	6	Alive		Y				
381	685	<i>Casuarina pauper</i>	1	30	6	Alive		Y	Y			
382	686	<i>Casuarina pauper</i>	2	25	6	Alive			Y			
383	687	<i>Casuarina pauper</i>	6	20	8	Alive			Y			
384	688	<i>Eucalyptus</i> sp.	4	28	6	Alive		Y				

6.1.1.2 Fauna recorded during habitat vegetation clearing activities, March 2020.

Date	Site Encountered	Species Name	Common Name	Number of Observations
10/03/2020	Ginkgo	<i>Cryptoblepharus</i> sp.	Unknown Cryptoblepharus	1
10/03/2020	Ginkgo	<i>Northiella haematogaster</i>	Blue Bonnet	2
10/03/2020	Ginkgo	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	8
10/03/2020	Ginkgo	<i>Oreoica gutturalis</i>	Crested Bellbird	1
10/03/2020	Ginkgo	<i>Gymnorhina tibicen</i>	Australian Magpie	1
10/03/2020	Ginkgo	<i>Chalinobus gouldii</i>	Gould's Wattled Bat	4
10/03/2020	Ginkgo	<i>Acanthiza apicalis</i>	Inland Thornbill	2
10/03/2020	Ginkgo	<i>Acanthiza nana</i>	Yellow Thornbill	1
10/03/2020	Ginkgo	<i>Smicronis brevirostris</i>	Weebill	1
11/03/2020	Ginkgo	<i>Barnardius zonarius barnardi</i>	Mallee Ringneck	2
11/03/2020	Ginkgo	<i>Gehyra versicolor</i>	Tree Dtella	1
12/03/2020	Crayfish	<i>Ctenophorus fordii</i>	Mallee Dragon	1
12/03/2020	Crayfish	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus	2
12/03/2020	Crayfish	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	1
12/03/2020	Crayfish	<i>Cryptoblepharus australis</i>	Inland Snake-eyed Skink	2
12/03/2020	Crayfish	<i>Petroica goodenovii</i>	Red-capped Robin	1
13/03/2020	Crayfish	<i>Strophurus elderii</i>	Jewelled Gecko	4
16/03/2020	Ginkgo	<i>Gehyra versicolor</i>	Tree Dtella	2
16/03/2020	Ginkgo	<i>Ctenotus regius</i>	Regal Striped Skink	2
17/03/2020	Ginkgo	<i>Corvus mellori</i>	Little Raven	5
17/03/2020	Ginkgo	<i>Oreoica gutturalis</i>	Crested Bellbird	1
17/03/2020	Ginkgo	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	3
17/03/2020	Ginkgo	<i>Cracticus torquatus</i>	Grey Butcherbird	1
17/03/2020	Ginkgo	<i>Tiliqua rugosa</i>	Stumpy-tailed Lizard	1
17/03/2020	Ginkgo	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	1

Date	Site Encountered	Species Name	Common Name	Number of Observations
18/03/2020	Crayfish	<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	4
18/03/2020	Crayfish	<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink	2
19/03/2020	Crayfish	<i>Morethia boulengeri</i>	Boulenger's Skink	1
19/03/2020	Crayfish	<i>Lerista punctatovittata</i>	Eastern Robust Slider	1
19/03/2020	Crayfish	<i>Ctenophorus fordi</i>	Mallee Dragon	1
23/03/2020	Crayfish	<i>Delma butleri</i>	Butler's Legless Lizard	1
23/03/2020	Crayfish	<i>Cryptoblepharus</i> sp.	Unknown Cryptoblepharus	1
23/03/2020	Crayfish	<i>Corvus coronoides</i>	Australian Raven	1
23/03/2020	Crayfish	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	1
23/03/2020	Crayfish	<i>Diporiphora nobbi</i>	Nobbi Dragon	1
23/03/2020	Crayfish	<i>Heteronotia binoei</i>	Bynoe's Gecko	1
23/03/2020	Crayfish	<i>Strophurus elderii</i>	Jewelled Gecko	1
23/03/2020	Crayfish	<i>Cryptoblepharus</i> sp.	Unknown Cryptoblepharus	1
23/03/2020	Crayfish	<i>Morethia boulengeri</i>	Boulenger's Skink	1
24/03/2020	Crayfish	<i>Tiliqua rugosa</i>	Stumpy-tailed Lizard	1
24/03/2020	Crayfish	<i>Rhipidura leucophrys</i>	Willie Wagtail	1
24/03/2020	Crayfish	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	1
24/03/2020	Crayfish	<i>Oreica gutturalis</i>	Crested Bellbird	1
24/03/2020	Crayfish	<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	5
24/03/2020	Crayfish	<i>Lerista timida</i>	Timid Slider	1
24/03/2020	Crayfish	<i>Cacatua roseicapilla</i>	Galah	1
24/03/2020	Crayfish	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	1
24/03/2020	Crayfish	<i>Ctenophorus fordi</i>	Mallee Dragon	1
24/03/2020	Crayfish	<i>Morethia boulengeri</i>	Boulenger's Skink	2
24/03/2020	Crayfish	<i>Menetia greyii</i>	Grey's Skink	4
24/03/2020	Crayfish	<i>Strophurus elderii</i>	Jewelled Gecko	8
24/03/2020	Crayfish	<i>Delma butleri</i>	Butler's Legless Lizard	4

Date	Site Encountered	Species Name	Common Name	Number of Observations
24/03/2020	Crayfish	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus	1
24/03/2020	Crayfish	<i>Gehyra versicolor</i>	Tree Dtella	5
25/03/2020	Crayfish	<i>Ctenotus regius</i>	Regal Striped Skink	2
25/03/2020	Crayfish	<i>Menetia greyii</i>	Grey's Skink	5
25/03/2020	Crayfish	<i>Morethia boulengeri</i>	Boulenger's Skink	4
25/03/2020	Crayfish	<i>Bat</i> sp.	Unknown Bat Species	1
25/03/2020	Crayfish	<i>Strophurus elderii</i>	Jewelled Gecko	10
25/03/2020	Crayfish	<i>Cryptoblepharus</i> sp.	Unknown Cryptoblepharus	2
25/03/2020	Crayfish	<i>Diporiphora nobbi</i>	Nobbi Dragon	2
25/03/2020	Crayfish	<i>Delma australis</i>	Marble-faced Delma	1
25/03/2020	Crayfish	<i>Lialis burtonis</i>	Burton's Snake-Lizard	2
25/03/2020	Crayfish	<i>Heteronotia binoei</i>	Bynoe's Gecko	1
26/03/2020	Ginkgo	<i>Barnardius zonarius barnardi</i>	Mallee Ringneck	1
26/03/2020	Ginkgo	<i>Climacteris picumnus</i>	Brown Treecreeper	1
26/03/2020	Ginkgo	<i>Corvus mellori</i>	Little Raven	1
26/03/2020	Ginkgo	<i>Morethia boulengeri</i>	Boulenger's Skink	2
26/03/2020	Ginkgo	<i>Gehyra versicolor</i>	Tree Dtella	5
26/03/2020	Ginkgo	<i>Menetia greyii</i>	Grey's Skink	4
26/03/2020	Ginkgo	<i>Ctenotus schomburgkii</i>	Barred Wedgesnout Ctenotus	3
26/03/2020	Ginkgo	<i>Ctenotus regius</i>	Regal Striped Skink	1
26/03/2020	Ginkgo	<i>Chalinolobus picatus</i>	Little Pied Bat	2
26/03/2020	Ginkgo	<i>Demansia psammophis</i>	Yellow-faced Whip Snake	1
26/03/2020	Ginkgo	<i>Tiliqua rugosa</i>	Stumpy-tailed Lizard	1
26/03/2020	Ginkgo	<i>Heteronotia binoei</i>	Bynoe's Gecko	1
26/03/2020	Ginkgo	<i>Diplodactylus vittatus</i>	Wood Gecko	1
26/03/2020	Ginkgo	<i>Cryptoblepharus</i> sp.	Unknown Cryptoblepharus	1
Total: 42 species, 161 individuals				

Appendix B – Detail of Vegetation Clearing Protocol used during 2020 pre-clearance inspections

This summary of the Vegetation Clearance Protocol aims to be a stand-alone document that provides all information needed to complete vegetation clearing activities. It includes requirements for assessing what steps need to be taken, and guides the use of activities in steps, from pre-clearance surveys, clearance techniques to animal welfare and translocation protocols, and managing captured, injured or deceased fauna.

Tronox Vegetation Clearance Protocol

This Vegetation Clearance Protocol has been developed to minimise the impacts of vegetation removal activities at Tronox Mining's Murray Basin mines on flora and fauna values, and address Cristal's ecological requirements of the Development Consent (DA 251-09-01) made under section 75W of the *Environmental Planning and Assessment Act 1979*.

This Vegetation Clearance Protocol is applicable to all native species of flora and fauna, and is focussed primarily on threatened species, being those listed under the National *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* and NSW *Biodiversity Conservation (BC) Act 2016*.

The requirements of this protocol are shown as the flowchart below.

The most critical factor in the successful implementation of vegetation clearing, and this protocol, is the timing of all activities in order to avoid impacting on breeding populations of threatened bats, reptiles and birds, and minimise impacts and maximise the opportunity for dispersal of these threatened species away from the clearing areas at a time when they are mobile and not hibernating.

The following is a brief summary of the key steps for the successful implementation of this protocol, which are also outlined in the flowchart, are subsequently explained in detail.

Clear delineation of disturbance areas

Remnant native vegetation immediately adjacent to areas proposed for clearing must be clearly marked and/or fenced to prevent accidental damage, or clearing of incorrect areas during vegetation clearance and construction activities.

Pre-clearance surveys

Flora Prior to any vegetation and habitat removal, targeted surveys for threatened flora species are to be undertaken for two species; Violet Swainson-Pea (*Swainsona adenophylla*) and Yellow-Keeled Swainsona (*Swainsona flavicarinata*) as per the consent conditions.

If these species are detected, Protocol 1 – threatened flora targeted surveys will be implemented.

Fauna

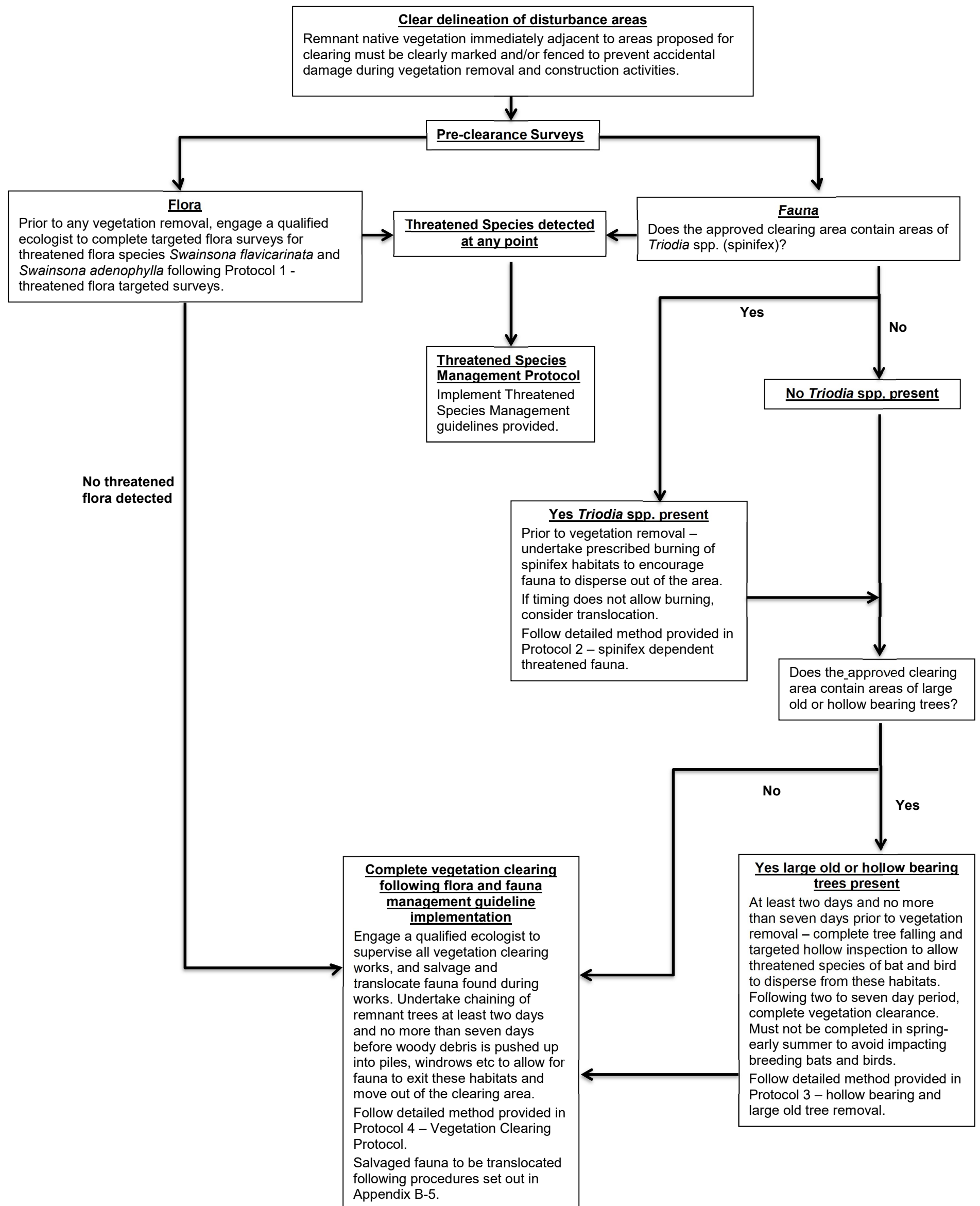
Spinifex dependent threatened fauna Prior to any vegetation and habitat removal, Protocol 2 – spinifex dependent fauna will be implemented. This aims to minimise impacts to threatened fauna species including Marble-faced Delma (*Delma australis*) and Western Blue-tongue (*Tiliqua occipitalis*).

This will involve the completion of a slow, cool, fuel-reduction burn to be completed in autumn or spring to remove habitats for these threatened species and encourage their dispersal out of the area. If timing and conditions do not allow this, other translocation techniques may be considered.

Hollow bearing and large old tree dependent fauna Prior to any vegetation and habitat removal, Protocol 3 - Hollow bearing and large old tree dependent fauna will be implemented. This aims to minimise direct impacts and mortality to threatened fauna species including: Little Pied Bat (*Chalinolobus picatus*), Inland Forest Bat (*Vespadelus baverstocki*), Corben's Long-eared Bat (*Nyctophilus corbeni*) and Major Mitchell's Cockatoo, (*Lophochroa leadbeateri*), by removing key habitat features and encouraging their dispersal out of the development area.

An ecologist experienced in the requirements of spinifex and hollow bearing dependent species should be involved to assist in the salvage and translocation of any non-dispersing or injured animals during these processes.

Tronox Vegetation Clearance Protocols Requirements



Appendix B1 – Vegetation Clearing Protocols

Protocol 1 for targeted threatened flora surveys

Targeted surveys for threatened flora species Violet Swainson-Pea (*Swainsona adenophylla*) and Yellow-Keeled Swainsona (*Swainsona flavicarinata*) are required. Although these species appear in the conditions, neither species has been detected in the area. Suitable habitat for both species is not present in the impact area. *S. adenophylla* in particular is considered highly unlikely to occur in the area, with just one previous record from NSW.

Surveys must be carried out by a suitably qualified ecologist, at least one week prior to the commencement of vegetation removal, to allow detection and documentation of these, or potentially other threatened flora species, and possible translocation of individuals to a suitable area following consultation with the NSW Office of Environment and Heritage (OEH). If either of these or other threatened flora species are recorded, details including population size will be submitted to the Atlas of NSW Wildlife.

Targeted survey would include random meander transects through potential habitat for these species.

A more detailed flora translocation procedure will be developed in consultation with OEH in the highly unlikely even that either of these species are found on site. This procedure will vary depending upon the species detected during pre-clearance threatened flora surveys, and would follow other similar translocation management plans for these or similar species produced previously, with individuals photographed, location recorded with GPS, and details documented and submitted to OEH.

Target Flora Species:

Violet Swainson-Pea (*Swainsona adenophylla*)

NSW TSC Act – Endangered

Slender perennial forb to 30 cm high, sparsely downy and with numerous stems. Leaves mostly 3-5 cm long, composed of 3-9 narrow leaflets, each with a gland at the tip. The plant is distinguished by the swollen leaflets and conspicuous glands. Flowers purple or pink, pea-like, 6-9 mm long. Pod narrow-oblong, 10-20 mm long, hairy.

Distribution: This species is most widespread in central South Australia, with records from one location in both New South Wales and Victoria. Was collected in 1979 from Barmah SF, near Echuca, in Victoria but has not been located since. In NSW it is known from one collection in Kinchega National Park, south west of Menindee, where it was described as 'common'.

Habitat and ecology: Grows on red sandy or stony flats, especially near lake margins. Associated species in South Australia include *Eucalyptus microtheca* and *Acacia* species. The records from Victoria were on higher River Red Gum (*Eucalyptus camaldulensis*) terraces, well away from the main river channel. Flowering period is June to September (or summer after good rains). Recorded in the Menindee area growing on sandy soil in a year of high winter rainfall. Most *Swainsona* species are erratic in occurrence, carpeting the landscape after significant rain in areas of low and irregular rainfall. Abundance in populations has been recorded as common and dominant.

Yellow-Keeled Swainsona (*Swainsona flavicarinata*)

NSW TSC Act Endangered

Greyish-green forb to about 45 cm high, the stems bearing coarse white hairs. Leaves composed of 5-9 leaflets, each 10-15 mm long, 5-10 mm wide, hairless above, softly downy beneath. Flowers pea-like, purple, red or pink with a greenish-yellow keel. Pod 10-15 mm long, softly downy.

Distribution: Not common in NSW, having an outlier population in the Broken Hill-Menindee district in the far western plains. More common in the southern parts of the NT and inland SA.

Habitat and ecology: Grows in deep red sand, recorded from a roadside on a treeless plain in NSW. In central Australia, the species grows in Mulga communities on red earths and on stony soils supporting Bladder Saltbush. Also found on sandy plains and ridges, in grassland, and in watercourses and floodplains near creeks or rock holes. Associated species include *Acacia murrayana*, *A. aneura*, *Maireana aphylla*, *Atriplex vesicaria*, *Triodia*, *Solanum* and *Euphorbia* spp. Flowers from June to October. Recorded as infrequent to locally common in populations. It is not known if fire is influential in promoting germination, although the species has been recorded in burnt areas in SA.

Protocol 3 for Hollow bearing and large old tree dependent targeted fauna surveys

A number of threatened fauna species which are reliant on large old and hollow-bearing trees either as refuge or for breeding purposes, are likely to occur in the vegetation clearing areas. Large old trees provide critical habitat in the form of hollows, deep cracks and crevices, and accumulations of loose bark which are used as roosting and breeding sites for a range of species of native microbats and birds. The size of tree, typically measured as diameter at breast height (DBH), at which hollows, cracks and crevices are likely to form, varies greatly between tree species, but is likely in mallee eucalypts over 15cm DBH, Black Box (*Eucalyptus largiflorens*) over 40cm DBH, and Belah (*Casuarina pauper*) over 40cm DBH (taken from Victorian EVC benchmarks for 'large old trees' in neighbouring Murray Mallee bioregion, part of the same Murray Darling Depression IBRA region). Additionally, any dead Belah containing hollows were also identified and checked during pre-clearance.

Prior to any vegetation and habitat removal, Protocol 3 - Hollow bearing and large old tree dependent fauna will be implemented for trees equal to or greater than the DBH benchmarks mentioned above. This aims to minimise direct impacts and mortality to threatened fauna species including: Little Pied Bat (*Chalinolobus picatus*), Inland Forest Bat (*Vespadelus baverstocki*), Corben's Long-eared Bat (*Nyctophilus corbeni*) and Major Mitchell's Cockatoo, (*Lophochroa leadbeateri*), by removing key habitat features and encouraging their dispersal out of the development area.

A major factor in the successful mitigation of impacts on threatened species from the clearing of hollow bearing and large old trees is the timing of these works. It is critical that clearing of hollow bearing and large old trees must not be completed between spring and early summer (September to January inclusive) to avoid impacting on threatened species of breeding bats and birds that are likely to be using these habitats. Hollow bearing and large old trees should also not be fallen in winter (June-August inclusive), when bats may be hibernating and have greater difficulty moving to neighbouring areas.

Previous pre-clearance surveys of remnant vegetation at Snapper mine site involved the thorough assessment of all trees on site (primarily Belah (*Casuarina pauper*)), targeting threatened bats in particular. During three surveys, 2,492 trees were assessed, with a total of 270 bats recorded in 128 trees, averaging a bat tree encounter rate of 5.1% (Ogyris 2013, 2014a, 2014b). Of the 270 bats recorded in fallen trees, 12 were threatened species, and of these, two mortalities of threatened species were recorded, of a total of 5 bat mortalities. This represents a residency rate of 0.5% and a mortality rate of 0.08% for threatened hollow dependent bat species. The low residency and mortality rates of bats in fallen trees suggests that the need to comprehensively examine each fallen tree is unlikely to be necessary or an effective mitigation measure, and that provided trees are fallen and left *in situ* for a sufficient period, resident animals should disperse of their own accord. The impacts to threatened bat species is likely to be minimal, as animals will be highly unlikely to return to hollows in fallen trees, and will move to neighbouring areas of habitat.

Clearing of hollow bearing and large old trees will ideally involve the falling of these trees by chainsaw, as opposed to by chaining, which is more destructive to the trees and hollows, and more likely to cause direct mortality to resident fauna. Areas of hollow bearing and large old tree are relatively small, and could easily be targeted for falling by chainsaw, a few days before remaining trees are fallen by chaining.

Clearing of trees, both hollow bearing and large old trees, and areas of smaller trees, must be completed two to five days immediately prior to the further clearance of remaining vegetation (i.e. pushing vegetation into heaps and windrows) to allow time for fauna to vacate these habitats, but not left for so long that other fauna may re-colonise them.

During the conduct of tree clearing, an appropriately qualified ecologist should be engaged to oversee and where necessary capture and translocate fauna which does not or is unable to disperse

themselves, or is injured. Capture and translocation of all animals will follow the translocation protocol outlined in Appendix B2.

Target Fauna Species:

Little Pied Bat (*Chalinolobus picatus*)

Listed as Vulnerable under the NSW BC Act.

The Little Pied Bat is a distinctive black and white bat that weighs four to eight grams. The head and body are about 4.5 cm in length; the tail 3.5 cm. The fur is glossy black on the back, grey on the belly, with white fur along the flanks forming a 'V' in the pubic area.

Distribution: The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria.

Habitat and ecology: This species occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Can tolerate high temperatures and dryness but need access to nearby open water. Feeds on moths and possibly other flying invertebrates.

Inland Forest Bat (*Vespadelus baverstocki*)

Listed as Vulnerable under the NSW BC Act.

One of a number of small (3 to 7 grams) insectivorous bats in the genus *Vespadelus*. It is generally sandy-brown above, with the underparts being paler (cream to pale brown). Identification is difficult, with overlap in size and fur colouration with some species occurring in the same area, particularly Southern Forest Bat *V. regulus* and Little Forest Bat *V. vulturnus*. These species can be separated by cranial measurements, genetic typing, or for males, glans penis morphology. Identification based on echolocation calls is also difficult, as there is considerable overlap in the frequency of the calls, particularly with the Little Forest Bat.

Distribution: Because of the difficulty of identification, the distribution of this species, particularly in NSW, is very poorly known. Believed to occur widely in all the mainland states, generally in areas with annual rainfall less than 400 millimetres. In Victoria it is confined to the extreme north west. In NSW it has been most regularly captured in the far south west, north from the Murray River to Menindee, and at least as far east as the Balranald-Ivanhoe Road. There is some evidence to suggest that this species also occurs in the central NSW mallee, centred on Nombinnie Nature Reserve, although there has been very little recent survey in this part of the state. There are also records just south of the Queensland border around the Culgoa River, though whether this connects with other NSW populations, or is the southern extent of a northern population is unknown. There are records further east in NSW but the identification of these records have not been confirmed. There are relatively few records of any *Vespadelus* species in the northwest of NSW and so whether this species does occur here is unknown. Some of the gaps in knowledge on the distribution of this and other bat species in western NSW probably reflects the lack of survey effort in most of this region.

Habitat and ecology: This species is known to roost in tree hollows and abandoned buildings. Known to roost in very small hollows in stunted trees only a few metres high. The habitat requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including Mallee, Mulga and River Red Gum. Most records are from drier woodland habitats with riparian areas inhabited by the Little Forest Bat. However, other habitats may be used for foraging and/or drinking. Colony size ranges from a few individuals to more than sixty. Females congregate to raise young in November and December, with young carried for the first week following birth. Young are independent by January. These bats fly rapidly and cover an extensive foraging area and are presumed to feed on flying insects.

Corben's Long-eared Bat (*Nyctophilus corbeni*) (listed by Commonwealth as Greater Long-eared Bat (*Nyctophilus timoriensis*))

Listed as vulnerable under both the NSW BC Act and EPBC Act

The south eastern form of the Greater Long-eared Bat is also known as Eastern Long-eared Bat and has recently been described as new species Corben's Long-eared Bat (*N. corbeni*). It is uniformly dark grey-brown. The ears are about 3 cm long and larger than the head. It has a low ridge of skin running between the eyes and across the nose. It has a head and body length of 5 - 7 cm and weighs about 14 grams.

Distribution: Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species.

Habitat and ecology: Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground. Mating takes place in autumn with one or two young born in late spring to early summer

Major Mitchell's Cockatoo, (*Lophochroa leadbeateri*)

Listed as Vulnerable under the NSW BC Act.

This unmistakable cockatoo of the dry inland, Major Mitchell's Cockatoo is the only Australian cockatoo that is salmon-pink below and white above. It is also called the Pink Cockatoo, and until recently was listed under the name of *Cacatua leadbeateri*. It is smaller than the Sulphur-crested Cockatoo *C. galerita*, but slightly larger than a Galah *Eolophus roseicapillus*. Its most prominent feature is its large white-tipped crest that is banded in red and gold. Its call is a distinctive stammering whinny.

Distribution: Found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that.

Habitat and ecology: Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Normally found in pairs or small groups, though flocks of hundreds may be found where food is abundant. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres.

Protocol 4 for vegetation clearing

1. Pre-clearance Flora and Fauna Surveys and Activities

Timing of vegetation clearance, and completion of pre-clearance activities is the single most important factor in the mitigation of impacts to threatened species. It is critical to the successful mitigation of impacts from the clearing of hollow bearing and large old trees that clearing must not be undertaken between spring and early summer (September to January inclusive) to avoid impacting on threatened species of breeding bats and birds that are likely to be using these habitats. Hollow bearing and large old trees should also not be fallen in winter (June-August inclusive), when bats may be hibernating and have greater difficulty moving to neighbouring areas.

Pre-clearance surveys must be undertaken by suitably qualified ecologists, the 'Project Ecologist', and are to be undertaken in three Stages – Stage 1, will involve fauna pre-clearance surveys while selected large old and hollow bearing trees are felled by chainsaw (beginning 2 to 5 days prior to remaining native vegetation removal). Stage 2 will involve the chaining of vegetation, including most tree removal, a minimum of 2 days but no more than 5 days before the further removal of remaining native vegetation in Stage 3; and Stage 3 will involve the subsequent removal of all remaining vegetation, for example by pushing of all cleared vegetation into heaps and windrows.

Stage 1 – Flora and fauna pre-clearance survey:

- i. Flora and fauna pre-clearance surveys must be completed following the methods and timelines summarised in Protocol 1, 2 and 3. Falling of hollow bearing and large old trees should be completed in the two to five days immediately preceding the clearance of remaining vegetation by chaining to allow fauna to move from the clearance area into the surrounding remnant native vegetation. It is critical that these timelines are followed to allow enough time for fauna to move out of these higher quality habitats, but not so long after that fauna may begin to re-colonise the habitats.
- ii. Prior to falling any targeted hollow-bearing trees or logs, a hard object (e.g., hammer, crowbar, excavator bucket – depending on size and strength of tree, limb or log) will be used to knock on the tree, limb or log for a period of 2-3 minutes, to encourage fauna to exit. Sticks, poles or other similar hand-held objects will also be used to hit the trunk of the tree at various points, to encourage animals to vacate the tree;
- iii. When targeted hollow-bearing and old trees are being cut down, Project Ecologists will be nearby (but at a safe distance). When the hollow-bearing section is down, and the contractor says that it is safe to proceed, the Project Ecologists will examine the fallen hollow-bearing section for any animals that may be present, and in the case of injured or deceased animals, will apply the capture and removal protocol outlined in Appendix B2 and B3 if necessary;
- iv. All hollow-bearing sections are to remain *in situ* for a minimum period of at least 48 hrs (but not more than a period of five days) prior to being moved to the storage area. Allowing the hollow section to remain on the ground for a restricted period will provide fauna the opportunity to vacate of their own accord (e.g. insectivorous bats), and will minimise the risk of subsequent re-colonisation by ground-dwelling fauna. All of these activities would be undertaken in consultation with the Project Ecologist;
- v. If threatened species are detected during this process, they will be recorded and reported to OEH, following Appendix B3 and B3;

Stage 2 – Removal of trees and vegetation, primarily by chaining:

- vi. Following pre-clearance flora and fauna surveys, when prioritised large old and hollow-bearing trees have been fallen and left in place for a minimum of two and no more than five days (to provide fauna the opportunity to vacate of their own accord, and minimise the risk of subsequent re-colonisation by ground-dwelling fauna), the chaining of vegetation will be completed to lay over all trees and large shrubs. Chaining of vegetation should be done at least two and no more than five days before the final stage 3 of pushing vegetation into heaps and windrows for storage, again to provide fauna the opportunity to vacate of their own accord, and minimise the risk of subsequent re-colonisation by ground-dwelling fauna. An ecologist will be available during this process to capture and salvage any injured fauna that are observed during this process.

Stage 3 – Remove Native Vegetation and pushing into heaps and windrows for storage

- vii. Following pre-clearance flora and fauna surveys, and the removal of trees and vegetation, primarily by chaining, at least two and no more than five days should elapse before trees, limbs and logs are pushed into heaps and windrows for storage of woody debris, again providing fauna the opportunity to vacate of their own accord, and minimise the risk of subsequent re-colonisation by ground-dwelling fauna.

2. Storage and replacement of removed trees, limbs and logs (including hollow bearing)

All cleared woody vegetation and timber (including hollowing bearing trees, logs and limbs) shall be stored as follows:

- viii. Rootballs, tree trunks and limbs, logs and woody debris greater than 5cm in diameter should be pushed into heaps or windrows and stored, along with topsoil, for later use during the rehabilitation process. Coarse woody debris provides a critical habitat feature to fauna that takes many years to develop in a rehabilitated area from regenerating vegetation, and can assist in reducing soil erosion from wind and water flow.

3. Pre-works Sites Surveys for Ground-dwelling fauna

- ix. Each morning, prior to the commencement of clearing, the 'clearance area' will be thoroughly searched by the Project Ecologist for the presence of native fauna;
- x. This will include a brief 'walk-over' of the site to check for fauna activity. This check will be more focussed at ground-dwelling fauna species that are less mobile, and therefore less able to avoid injury or death during the clearance process;
- xi. Captured native fauna will be moved to suitable adjacent habitat using the protocols outlined in Appendix B5;

4. Identification of native fauna

- xii. The Project Ecologist will be immediately informed of the presence of native fauna in or within close proximity to the vegetation clearance area. The Project Ecologist will determine if the animal is at any risk of injury or mortality from clearing activities;
- xiii. If it is determined by the Project Ecologist that none of the construction activities are likely to increase the risk of injury, mortality or stress to the animal, the construction activities can continue and the fauna species will be monitored to make sure it doesn't enter parts of the clearance area that could potentially result in the injury or death of the animal;
- xiv. If the Project Ecologist determines that some or all of the construction activities are likely to increase the risk of injury, mortality or stress to the animal, then the Project Ecologist shall 'capture and translocate' the animal in accordance with the measures identified in Appendix B2. Vegetation clearing activities will be monitored closely to ensure that it does not impact the animal at risk in the time leading up to its capture and removal from site.

With all stages of the vegetation clearing process it is important that contractors should not handle any fauna at all, but should contact the Project Ecologist to attend the site and carry out the capture and removal protocols outlined in Appendix B5;

Monitoring

Post clearance monitoring will focus on areas of surrounding remnant vegetation, and the area of Offset linked to this area of clearing. This monitoring is detailed in the Offset management Plan. Monitoring of flora, fauna, and ecological condition and function will focus on the improvement of the offset area from its baseline levels, and of any changes in the neighbouring clearance area.

References

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Ogyris Ecological Research (2014b) Pre-clearance Fauna Report of Land at Cristal Mining Australia Ltd. Murray-Darling Basin Sites: Snapper Mine: Stage 2 – Winter 2014. Prepared for Cristal Mining Australia Ltd.

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Managing captured, injured and deceased animals.

Appendix B2 - Animal Welfare Handling and Translocation Protocols

Protocol for all Animals

All native animals encountered during the Project will be treated humanely, ethically, and in accordance with relevant codes under the NSW *Prevention of Cruelty to Animals Act 1979*, including:

- Australian code of practice for the care of animals for scientific purposes (NHMRC 20048);
- Code of practice for injured, sick and orphaned protected fauna (110004, OEH 2013); and
- Animal ethics considerations and protocols outlined in this document.

For any native terrestrial fauna that are found within the Vegetation Clearance Area, and considered to be at risk of injury, mortality or stress by on-going construction activities, a Project Ecologist will 'capture and release' this animal according to the following protocol:

- All vegetation clearing activities that are considered by the Project Ecologist to be likely to increase the risk of injury, mortality or stress to the animal will be halted until the animal has been removed, which will be enforced with the co-operation of the site vegetation clearing Manager. Clearing native vegetation should not occur during the winter and spring hibernation and breeding seasons for many species (May to September inclusive). Vegetation clearing activities that are not likely to increase the risk of injury, mortality or stress to the animal can continue (as determined by the Project Ecologist).
- Only qualified ecologists with the correct permits from OEH will be allowed to handle animals, except under exceptional circumstances where the animal's welfare is put at risk;
- Animals will be captured by the Project Ecologist using a safe and ethical technique, as is appropriate for the species. For mobile uninjured animals, this may include safe and ethical actions such as encouraging the animals to depart the vegetation clearing area by themselves (without physical capture of the animal). Animals that are unable to depart of their own accord will be captured and held in an appropriate receptacle until release. All captive held animals will be provided with food, water and heat as is appropriate for the species (as outlined in Appendix B. Each receptacle will only hold one animal at a time and will be cleaned and disinfected between uses to avoid the spread of disease (Appendix B). (See Appendix B for description of containers for holding animals that are likely to be detected within the project area).
- Uninjured captured individuals are to be immediately released at the nearest suitable habitat away from the vegetation clearing area;
 - 'Suitable locations' will include habitats that are considered appropriate for the species, as determined by the Project Ecologist (e.g. sufficient protective cover, habitat features likely to support adequate food and water;
 - If the Project Ecologist is not trained to handle snakes, then either another Project Ecologist who is trained and experienced handling snakes will be brought to the site, or a licensed snake catcher will be engaged. Licensed snake handlers in the local area should be identified and alerted before the commencement of vegetation clearing activities. Efforts will be made to prevent snakes entering the vegetation clearing area. Project Ecologists will be trained and experienced in determining the differences between legless lizards (such as *Delma* spp. and *Pygopus* spp.) and snakes (particularly juvenile snakes); and
 - For particular species (e.g., nocturnal species), the Project Ecologist may also determine that it is beneficial to hold the animal/s safely in an appropriate receptacle until (or after) sunset to reduce risks to the animal such as disorientation or attack from predators. The receptacle will be kept in a shaded or otherwise suitable location during the day so that the temperatures experienced by the animals are well within safe ranges. At all times, the container will be kept in a secure location, under the responsibility of the Project Ecologist
- If an injured animal is found within the Vegetation clearing Area, then a Project Ecologist will immediately take this animal to a nearby veterinarian for assessment (Appendix B3 and B4);
 - For animals whose injuries can be repaired with a good chance of a successful return to the wild (as determined by the veterinarian), they will be placed into the care of a local and 'accredited party' if they are experienced in the care of that particular animal species. The 'accredited party' only includes person(s) authorised under the Wildlife Act as a wildlife shelter operator, foster carer or holder of an appropriate research permit number or an authorised officer under the Act to handle animals. For particular species of injured animals where the local 'accredited party' is not qualified in their care and recovery (in accordance with the Veterinary Practice Act 1997), alternative 'accredited party(s)' will be arranged from a wider area; In consultation with OEH, a suitable solution will be determined prior to the commencement of vegetation clearing if there are animals for which no suitable 'accredited

- parties' can be found. If injured animals are found which were not anticipated prior to vegetation clearing, advice from OEH will be sought on an appropriate solution.
- When injured animals have recovered sufficiently, they will be released safely at the point of capture by the Project Ecologist in suitable habitat;
- Animals whose injuries have a poor chance of repair or for which a successful return to the wild is considered unlikely (as determined by the veterinarian - and as specified in the Prevention of Cruelty to Animals Act 1979) will be euthanised humanely by the veterinarian (Appendix B4); and
- The Project Ecologists will offer deceased animal individuals to the Museum of NSW. If the Museum is not interested in taking some or all of the specimens, then the specimens will be offered to OEH as a second option. If both the Museum and OEH are not interested in the specimen, then it must be disposed of thoughtfully and hygienically – either buried, burned or securely wrapped and disposed of in the waste collection. The latter would not be appropriate for large animals (e.g. kangaroos).
- Threatened animals or other captured fauna are not to be released to sites far away from their capture point. If a circumstance arises that an animal cannot be released within 1000 metres of their capture point (e.g. due to lack of habitat or other risks), then a Senior OEH Flora and Fauna Officer will be consulted prior to release of the animal in the next nearest appropriate habitat. Written consent will be required (including email) to release the animal at a distance greater than the distances specified for that species. The Wildlife Act permit for the Project must allow sufficient flexibility that the distances that animals can be released from their point of capture can be increased beyond the specified distances at the discretion of Senior OEH Flora and Fauna Officers; and
- The time, location, Project Ecologist's name that captured the animal and other relevant details will be marked on a recording sheet.

If any threatened species are captured and released, then the Project Ecologist will inform OEH using the prepared form in Appendix B3 to make them aware of the actions undertaken. The technique and timeframe for notifying OEH will be agreed with OEH. Records of all animals that are handled, or otherwise managed, within the Vegetation clearing Area will be maintained on a Project register or database (including both dead and alive individuals). Data to be recorded includes the animal species and number, location, date and collector. Along with an interim report, this data will be supplied to OEH quarterly for inclusion on the NSW Wildlife Atlas.

Holding Containers for Fauna

Appropriate containers for temporarily holding various types of animals include:

- Small calico bag (~ 20 cm x 30 cm with cord to secure the opening): Lizards, dragons, microchiropteran bats. Bag then slung from beam in a holding box until the time of release;
- Large calico bag or pillow slip (~ 60 cm x 90 cm with cord to secure the opening): Snakes, medium-sized arboreal mammals. Bag then stored in a cardboard box with padding if required for transport;
- Cage trap (~ 30 cm x 30 cm x 60 cm): medium sized mammals. Trap to be covered with bag to reduce stress;
- Elliot trap: small mammals (e.g. Pygmy Possum) and reptiles (e.g. lizards);
- Plastic 'lunch-box'- style container (~ 10 cm x 10 cm x 20 cm) with appropriate habitat features, some water (or dampened cloth) and air holes: frogs;
- Sealable containers (~ 1-2 litres): tadpoles;
- Small box/open container with appropriate material for nestlings.
- Capture and temporary holding of feral animals (cats and foxes), large native mammals (kangaroo, wallaby and mega-chiropteran bats) and injured animals will be discussed with OEH on a case-by case basis.

Every trap/device/container used in connection with this project must be clearly labelled, showing the "Flora and Fauna Permit number". This is in accordance with the permit conditions on the Wildlife Act Management Authorisation.

If any threatened species is captured and released, OEH has to be informed using the form titled "Form to Report to OEH of Captured, Injured or Deceased Threatened Fauna Species" (Appendix B3).

Appendix B3 - Form to report to OEH of Captured, Injured or Deceased Threatened Fauna Species

Form to Report to OEH of Captured, Injured or Deceased Threatened Fauna Species			
If a threatened species is captured and released, then the Project Ecologist(s) will inform OEH in writing within two working days to make them aware of the actions undertaken.			
<u>CAPTURE DETAILS</u>			
Project Ecologist(s):		Contact No:	
Date of Capture:		Time of Capture:	AM / PM
Location of Capture:		Easting:	Northing:
Number and Species of Animal Captured:			
Condition of Animal (circle)	Uninjured	Injured	Deceased
Comments: If injured, provide details of veterinary outcome. If deceased, provide details of lodgement with the Australian Museum, OEH or other appropriate disposal techniques if not taken by the Museum or OEH.			
<u>RELEASE DETAILS</u>			
Project Ecologist(s):		Contact No:	
Date of Capture:		Time of Capture:	AM / PM
Location of Capture:		Easting:	Northing:
Details of the Release Location (proximity to capture point, habitat type, features, etc.).			
Further details of release site if >150 m from capture site (e.g. pre-release approval from OEH, reasoning, etc.).			
Further Details / Mud Map:			

Appendix B4 - NSW Code of practice for injured sick and orphaned protected fauna

Available at:

<https://www.environment.nsw.gov.au/wildlifelicences/RehabFaunaCode.htm>

Appendix B5 - Translocation Process

The translocation of any threatened flora and fauna species will be conducted in accordance with the Vegetation Clearing Protocol, and the guidelines provided throughout Appendix B, which includes:

- NSW Code of practice for injured sick and orphaned protected fauna;
- NPWS (2001b) Policy for the Translocation of Threatened Fauna in NSW;
- Australian Network for Plant Conservation (ANPC) (2004) Guidelines for the Translocation of Threatened Plants in Australia;
- IUCN (1987) Position Statement on Translocation of Living Organisms; and
- IUCN (1998) Guidelines for Re-Introductions.

Definitions of 'translocation'

Translocation of Threatened Flora Species (Australian Network for Plant Conservation, 2004)	Translocation of Threatened Fauna Species (NPWS, 2001b)
Translocation: is the deliberate transfer of plants or regenerative plant material from one place to another, including existing or new sites or those where a taxon is now extinct. There are four types of translocation: Re-stocking: an attempt to increase population size or diversity by adding further individuals to an existing population. Re-introduction: an attempt to establish a population in a site where it formerly occurred, but where it can now reasonably be held to be extinct. Introduction: an attempt to establish a population in a site where it is not known either to occur now or to have occurred in historical times, but which is within the known distribution range and habitat type of the taxon. Conservation introduction: an attempt to establish a taxon, for the purpose of conservation, in an area that is outside the known distribution range of the taxon, but which is an appropriate habitat for the taxon.	Translocation: is the movement of living organisms from one area with free release in another. There are three types of translocation: Introduction: the release of an organism outside its historically known range. Re-introduction: the release of an organism into part of its historically known range from which it has become extinct. Supplementation: addition of individuals to an existing population of the same species.

The translocation process involves the following components:

- *Feasibility Assessment* - including a biological and ecological assessment of the species, an environmental assessment of the translocation site and a logistical assessment. This assessment will be conducted prior to the threatened species being translocated.
- *Translocation Protocol* consisting of: *Translocation Proposal* - to be prepared utilising the information obtained by the feasibility assessment and submitted to the NPWS for approval. The Translocation Proposal will be prepared in accordance with the NPWS (2001c)
- *Guidelines for the Contents of a Translocation Proposal. Pre-translocation Preparation* – the implementation of actions outlined in the Translocation Proposal required prior to

translocation of the species (eg. marking out boundaries of the translocation habitat for flora species, experimental trials, appropriate regeneration/restoration of habitat and amelioration or removal of uncontrolled threats).

All stages of the translocation process are documented.

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