TEC Coal Pty Ltd

July 2025

Meandu Mine
King 2 East Project

Multi Species Management Program (High-risk of impacts)

Question today
Imagine tomorrow
Create for the future

Meandu Mine King 2 East Project
Multi Species Management Program (High-risk of impacts)

TEC Coal Pty Ltd

WSP
Level 12, 900 Ann Street
Fortitude Valley QLD 4006
GPO Box 2907
Brisbane QLD 4001

Tel: +61 7 3854 6200
Fax: +61 7 3854 6500
wsp.com

Rev	Date	Details
Final	03/07/2025	Final

	Name	Date	Signature
Prepared by:	Carla Meers Bastian Steinrucken	03/07/2025	C.P.Meers Bastian Steinrucken
Reviewed by:	Carla Meers	03/07/2025	C.P.Meers
Approved by:	Carla Meers	03/07/2025	C.P.Meers

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

Table of contents

List of tables

List of figures

List of photographs

List of appendices

Abbreviations

ASA	Additional surface area
Biosecurity Act	*Biosecurity Act 2014* (Queensland)
DAWE	The former Department of Agriculture, Water and the Environment (Commonwealth) (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DES	Former Department of Environment and Science (Queensland) (now DETSI)
DESI	Former Department of Environment, Science and Innovation (Queensland) (now DETSI)
DEWHA	The former Department of Environment, Water, Heritage and the Arts (Commonwealth) (now DCCEEW)
DNRME	Department of Natural Resources, Mines and Energy (Queensland)
DSEWPaC	The former Department of Sustainability, Environment, Water, Population and Communities (Commonwealth) (now DCCEEW).
EA	Environmental Authority
EO Act	Queensland *Environmental Offsets Act 2014* (Queensland)
EO Regulation	*Environmental Offsets Regulation 2014*
EP Act	*Environmental Protection Act 1994* (Queensland)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
GIS	Geographic Information System
HVR	High Value Regrowth
K2E	King 2 East
K2E ASA	King 2 East Additional Surface Area
ML	Mining Lease
MNES	Matters of National Environmental Significance, as identified under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
MSES	Matters of State Environmental Significance, as identified under the Queensland *Environmental Offsets Act 2014*
NC Act	*Nature Conservation Act 1992* (Queensland)
NC Regulation	Nature Conservation (Animals) Regulation 2020 (Queensland)
PMST	Protected Matters Search Tool
RE	Regional Ecosystem
SEQ	South East Queensland
SLC	Special least concern

SMP	Species management program
SQEP	Suitably qualified and experienced person
SEVTDR	Semi-evergreen vine thicket and dry rainforest habitat
TEA	Terrestrial Ecological Report
TEC	Threatened Ecological Community
VM Act	*Vegetation Management Act 1999* (Queensland)

1 Introduction and purpose

1.1 Overview

Fauna species native to Queensland are protected under the *Nature Conservation Act 1992* (NC Act). Under section 335 of the Nature Conservation (Animals) Regulation 2020 (NC Regulation) a person must not tamper with an animal breeding place unless, amongst other matters, the tampering (including removal of the breeding place but not the animal) is part of an approved species management program (SMP). An SMP – high risk of impacts (High-risk SMP) is required for:

- least concern animals that are colonial breeders
- special least concern (SLC) animals (as prescribed in the NC Regulation)
- near threatened, vulnerable, endangered, critically endangered, or extinct in the wild animals (as prescribed in the NC Regulation).

An SMP – low risk of impacts (Low-risk SMP) is required for least concern animals that are not colonial breeders. This High-risk SMP addresses requirements of the NC Regulation as it relates to tampering with protected animal breeding places prior to and during works conducted for the King 2 East (K2E) Project. It has been prepared in accordance with the requirements of the *Information Sheet, Species Management Program – Requirements for tampering with a protected animal breeding place in Queensland* (DES, Version 1.00, effective 22 August 2020) and will require approval from the Department of Environment, Tourism, Science and Innovation (DETSI) under the NC Act.

Works associated with the K2E project will involve clearing 17.7 ha of remnant semi-evergreen vine thicket and dry rainforest (SEVTDR) habitat. This SEVTDR habitat supports microhabitat features for threatened species such as deep leaf litter, coarse woody debris and large logs suitable for the Black-breasted Button-quail, Spotted-tail Quoll and Short-beaked Echidna. Dense, moist vegetation within SEVTDR semi-evergreen vine thicket and dry rainforest acts as animal breeding places for the Rufous Fantail, Black-faced Monarch and Spectacled Monarch. Mature trees with hollows, decorticating bark, and fissures provide animal breeding places for 15 microbat species recorded during field surveys within the K2E ASA.

This High-risk SMP outlines the management measures to be implemented during SEVTDR clearing works to minimise impacts to the relevant protected species. As a number of these species are also matters of national environmental significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), this High-risk SMP has been adapted to incorporate specific requirements from the *Environmental Management Plan Guidelines* (Commonwealth of Australia, 2014). In particular, the impact avoidance, minimisation, mitigation and management measures outlined in this High-risk SMP have been developed using Specific, Measurable, Achievable, Relevant and Time bound (SMART) criteria. This High-risk SMP will be submitted to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) as part of the assessment of the K2E Project by Preliminary Documentation under the EPBC Act.

1.1.1 K2E Project

TEC Coal Pty Ltd (TEC Coal), a wholly owned subsidiary of Stanwell Corporation Limited (Stanwell), is seeking approval to increase the approved surface rights area at the Meandu Mine. Meandu Mine is an open-cut coal mine operated by BUMA on behalf of TEC Coal Pty Ltd (TEC Coal) and is located in Queensland's South Burnett region, approximately 150 kilometres (km) north-west of Brisbane. The K2E Project (the Project), involves increasing the approved surface rights area within Mining Lease (ML) 6674 by an additional 186 hectares (ha) (an approximate 7 percent increase to the existing approved surface rights area) which will allow progression of the existing K2E pit to the east.

Meandu Mine is located wholly within coal mining lease ML6674, which was granted on 19 February 1981. ML6674 occupies a total area of 4,267 ha within the South Burnett Regional Council and Toowoomba Regional Council local government areas. TEC Coal currently holds surface rights for approximately 2,640 ha of ML6674.

Mining in the proposed K2E additional surface area (ASA) will be conducted using the same mining equipment types as currently used. This includes open cut mining with a dragline and truck and excavator fleets. Key associated activities to be undertaken as part of the K2E Project are:

- construction of transport infrastructure (i.e. extension of the existing mine haul road, light vehicle road network)
- extension of the existing mine water management system including any erosion control structures that are required
- extension of the existing internal electrical transmission network for mine equipment; and
- establishment of communication network requirements.

1.1.2 Project approvals

State approval for the K2E Project was sought via an Environmental Authority (EA) amendment application for EPML00709113 under the *Environmental Protection Act 1994* (EP Act) which was received by DES on 1 April 2021. On 23 November 2021, DES approved the application to amend EPML00709113 under section 172(2)(a) of the EP Act. The K2E Project: Terrestrial Ecological Assessment Report (WSP, 2021) was prepared to support State approval of the K2E Project.

The K2E Project was referred to the then Commonwealth Department of Agriculture, Water and the Environment (DAWE) (now DCCEEW) in July 2021 for determination of whether the Project was considered a controlled action under the EPBC Act. Information about the K2E Project was published on the EPBC Referral website on 27 July 2021. On 6 September 2021, a delegate of the Minister for the Environment determined that the K2E Project is a controlled action, to be assessed via preliminary documentation under section 95(1) of the EPBC Act. Additional desktop and field investigations were undertaken in support of the assessment via preliminary documentation. As such, the preliminary documentation assessment expands on information presented in the K2E Project: Terrestrial Ecological Assessment report (WSP, 2021). Where relevant, information from the preliminary documentation has been used to inform development of this High-risk SMP and as such this High-risk SMP reflects the most up to date information, particularly in respect of the additional survey effort that has been undertaken since submission of the K2E Project: Terrestrial Ecological Assessment Report (WSP, 2021).

The K2E Project: MNES (Preliminary Documentation) Assessment Report EPBC 2021/8999 was submitted to DCCEEW for public comment on 27/07/2021. A copy of the K2E Project: MNES (Preliminary Documentation) Assessment Report (WSP, 2023) and the K2E Project Terrestrial Ecology Report (WSP, 2021) are available on the Commonwealth Departments website at https://epbcpublicportal.environment.gov.au/all-referrals/project-referral-summary/?id=7d6ac5e9-a0e2-eb11-80c6-00505684c137.

1.1.3 Objectives

The primary objective of this High-risk SMP is to outline protocols to protect, manage and mitigate impacts to breeding places of the threatened species listed in Section 2.2 prior to and during vegetation clearing works, as well as during the post-clearing phase.

This High-risk SMP also aims to protect, manage and mitigate impacts to breeding places of least concern species, as well as guide the management of all individual animals that may be present within the K2E ASA.

1.2 Report structure

Table 1.1 details the location of key information as required in accordance with Table 1 of DETSI's Information sheet: *Species Management Program – Requirements for tampering with a protected animal breeding place in Queensland* (DES, 2020).

Table 1.1 Location of additional information required for SMP high risk of impacts

Information requirement	Document location
Applicant's details	Applicant – Section 2 Location – Section 1.3 Approved agents – Section 2.3
Terms of approval	Section 2.4
Assessment of impacts to animal breeding places	Section 3
Impact management plan	Section 5

1.3 Project location

The activity to which this High-risk SMP applies is the K2E Project. The K2E Project involves increasing the approved surface rights area at the Meandu Mine (within ML6674) by an additional 186 ha which will allow progression of the existing K2E pit to the east. The location and extent of potential impacts is illustrated on Figure 1.1.

1.3.1 Areas of investigation

The terminology used within this High-risk SMP relates to K2E Project extents and surrounds, namely:

- *K2E ASA* – which is the proposed area of permanent and temporary ground disturbance associated with the K2E Project. The potential impact area of this High-risk SMP is based on the SEVTDR within the K2E ASA.
- *Study area* – the portion of ML6674 and immediate surrounds, overlapping the K2E ASA and incorporating vegetation and habitats to the north, east and south.
- *Locality* – the extent of 10 km radius database searches relevant to the Project.

The K2E ASA and Study area are illustrated on Figure 1.1.

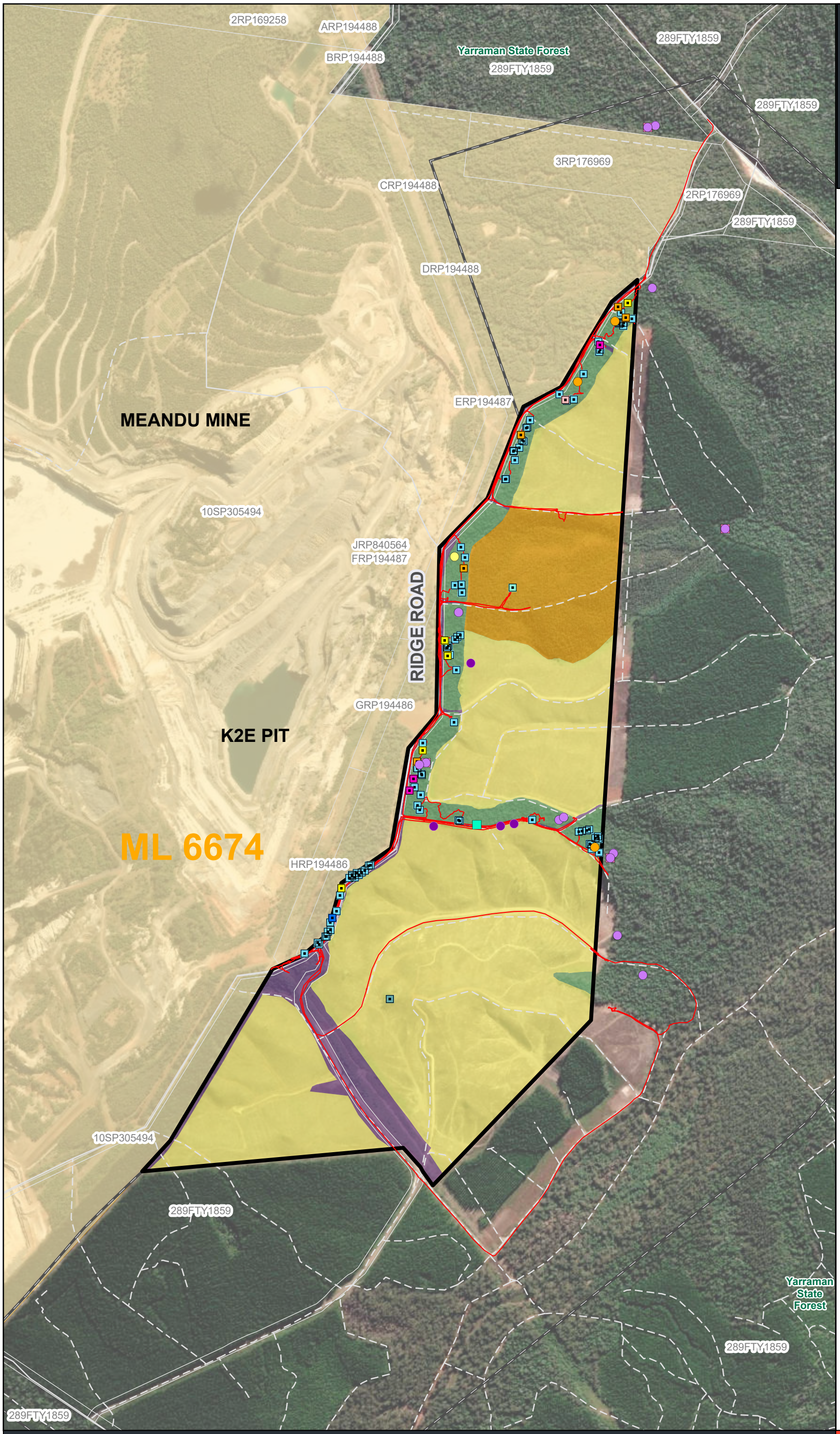
The K2E ASA incorporates part of Lot 289 on FTY1859 (Yarraman State Forest) and sections of road reserve of each of Ridge Road and the unnamed road that connects Ridge Road to Tarong-Yarraman Road, Yarraman (refer Table 1.2).

Table 1.2 Lot on Plan numbers of the existing surface rights area of ML6674 and K2E ASA

Mining lease	Property details (lot on plan)		Land tenure	Landowners, trustees/lessees
	Approved surface rights area	K2E ASA		
ML6674	Lot 10 on SP305494 Lot 111 on FY817 Lot 1 on SP181280 Lot 2 on RP169258 Lot 3 on RP176969 Lot 289 on FTY1859 Lot 11 on SP305493 Lot 101 on SP305492 Lot 161 on FY2298	Lot 289 on FTY1859 (Yarraman State Forest)	State Forest	The State of Queensland (Represented by the Department of Resources) owns the land. HQPlantations Pty Ltd (HQPlantations) is the Plantation licence holder of PLP0289.
		Ridge Road	Road Reserve	The State of Queensland (Represented by the Department of Resources) owns the road. Toowoomba Regional Council/South Burnett Regional Council are trustees.

Meandu Mine – K2E Project Species Management Program

Figure 1.1
Breeding Places Survey Results



Legend

- Study Area
- K2E ASA
- Approved Surface Right Area
- Survey Tracks March 2025

Species Recorded

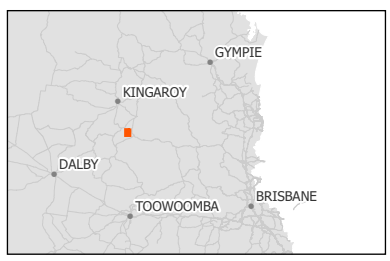
- Rufous Fantail
- Black-faced Monarch
- Short-beaked Echidna
- Black-breasted Button-quail (2017-2019)
- Black-breasted Button-quail (2021-2022)

Habitat Features

- Bird Stick Nest
- Arboreal Termite Nest
- Ground Nest - Brush Turkey
- Hollow Log
- Log Pile
- Log
- European Bee Hive - Ground
- Vine Thicket patch
- Hollow-bearing Tree

Fauna Habitat Type

- Exotic / native shrubby grasslands and bare earth tracks
- Hoop Pine plantation
- Juvenile hardwood plantation
- Semi-evergreen vine thicket and dry rainforest



0 0.25 0.5
Kilometers

Coordinate system: GDA 1994 MGA Zone 56

Scale ratio correct when printed at A3

1:12,000

Date: 15/04/2025

Data sources: - DNRME, TMR, Translink, Geoscience Australia
World Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

C:\Users\AUAC507280\WSP O365\AU-WKG - Geospatial - AIS - Documents\Projects\PS222292_Meandu_K2E\Pro\PS222292_Fig1-1_PotentialImpacts_r1v1\PS222292_Fig1-1_PotentialImpacts_r1v1.aprx

2 Applicant details

2.1 Applicant details

This High-risk SMP has been prepared in accordance with section 335 of the NC Regulation.

On its approval by the chief executive at DETSI, this High-risk SMP will become recognised as an approved species management program for the purposes of section 335 of the NC Regulation. It will apply to TEC Coal's K2E Project. This High-risk SMP is also being submitted to DCCEEW along with the Preliminary Documentation for EPBC Act approvals for Project-related impacts to MNES, particularly the Black-breasted Button-quail (*Turnix melanogaster*).

This High-risk SMP prescribes the impact management measures to mitigate the risk of proposed Project-related impacts upon habitat that contains animal breeding places that are likely to be actively used to incubate and rear young for threatened fauna species listed under the NC Act (and EPBC Act), which are applicable to this High-risk SMP.

The Approved Entity authorised to tamper with an animal breeding place only in a manner that is in accordance with the conditions specified in the approved High-risk SMP is TEC Coal, including all its employees, agents and associated contractors (the concept of approved agents is discussed in Section 2.3 below).

All correspondence regarding this High-risk SMP should be addressed to:

Table 2.1 Nominated applicant contact details

Registered legal entity name:	**TEC Coal Pty Ltd**
ABN:	55119063900
Nominated person in charge:	Jaco Jansen
Email:	Jacob.Jansen@stanwell.com
Address:	Meandu Mine – Tarong Power Stations, PO Box 15, Nanango, QLD 4615

2.2 Applicable species

Threatened species requiring a High-risk SMP are:

- protected animals prescribed under the NC Regulation as extinct in the wild, critically endangered, endangered, vulnerable, near threatened, or a special least concern animal; or
- least concern animals that are colonial breeders; or
- least concern animals where proposed tampering with a breeding place may have impacts on the broader population of the species.

The species to which this High-risk SMP applies are listed below. These species are recognised as threatened fauna species listed under the NC Act (and EPBC Act) or least concern (colonial breeder) species:

- Black-breasted Button-quail (*Turnix melanogaster*) – listed as vulnerable under the NC Act and EPBC Act
- Short-beaked Echidna (*Tachyglossus aculeatus*) – listed as special least concern under the NC Act
- Spotted-tail Quoll (SE mainland population) (*Dasyurus maculatus maculatus*) – listed as endangered[1] under the NC Act and EPBC Act
- Rufous Fantail (*Rhipidura rufifrons*) – listed as special least concern[1] under the NC Act and Migratory under the EPBC Act
- Black-faced Monarch (*Monarcha melanopsis*) – listed as special least concern[1] under the NC Act and Migratory under the EPBC Act
- Spectacled Monarch (*Symposiachrus trivirgatus*) – listed as special least concern[1] under the NC Act and Migratory under the EPBC Act.

15 species of bats from the suborder Yangochiroptera, collectively referred to as microbats, listed as least concern (colonial breeders) under the NC Act, namely:

- White-striped Free-tail Bat (*Austronomus australis*)
- Gould's Wattled Bat (*Chalinolobus gouldii*)
- Chocolate Wattled Bat (*Chalinolobus morio*)
- Little Pied Bat (*Chalinolobus picatus*)
- Northern Long-eared Bat (*Nyctophilus bifax*)
- Gould's Long-eared Bat (*Nyctophilus gouldii*)
- Lesser Long-eared Bat (*Nyctophilus geoffroyi)*
- Ride's Free-tailed Bat (*Ozimops ridei*)
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*)
- Western Broad-nosed Bat (*Scotorepens balstoni*)
- Little Broad-nosed Bat (*Scotorepens greyii*)
- Eastern Broad-nosed Bat (*Scotorepens orion*)
- Inland Forest Bat (*Vespadelus baverstocki*)
- Eastern Forest Bat (*Vespadelus pumilus*); and
- Little Forest Bat (*Vespadelus vulturnus*).

It should be noted that although the Rufous Fantail, Black-faced Monarch, and Spectacled Monarch are now listed as least concern under the NC Act, they were listed as special least concern at the time of the EPBC Referral and have therefore been included in this High-risk SMP:

- The identified animal breeding places for the above applicable species and map of the corresponding supporting habitats at risk of potential Project-related impacts is presented in Section 3.2.3 and Figure 1.1.
- A description of the species profile for each applicable species or species group, is presented in Section 4.
- The impact mitigation and management measures are presented in Section 5.

[1] It should be noted that, in the period between the development of the K2E Project: Terrestrial Ecological Assessment Report (WSP, 2021) and this High-risk SMP, the following conservation status listings were updated:
- the Spotted-tail Quoll (*Dasyurus maculatus maculatus*) was elevated from vulnerable to endangered under the NC Act.
- the Rufous Fantail (*Rhipidura rufifrons*), Black-faced Monarch (*Monarcha melanopsis*), and Spectacled Monarch (*Symposiachrus trivirgatus*) were removed from the EPBC Act as 'migratory' and changed from 'special least concern' to 'least concern' under the NC Act.

2.3 Approved agents

For the purpose of this High-risk SMP, the term “agents” refers to all suitably qualified and experienced persons (SQEP) employed, contracted or subcontracted by TEC Coal or by an entity employed, contracted or subcontracted by TEC Coal and who are undertaking activities associated with vegetation clearing works for the Project.

The primary agents involved in the Project include the mining services contractor, which operates Meandu Mine on behalf of TEC Coal. At the time of this High-risk SMP, the mining services contractor is BUMA Australia Pty Ltd.

2.4 Duration of approval

The approved High-risk SMP will be valid and in effect for five years after the date of DETSI approval. TEC Coal may review this document and discuss any potential updates with DETSI whenever TEC Coal considers it necessary, or DETSI requests a review.

2.5 Information sources

The information used in preparing this High-risk SMP included:

- publicly available species descriptions and profile information
- King 2 East Project: Terrestrial Ecological Assessment Report (WSP, 2021) included as Attachment 5 of the EPBC Act Referral (EPBC 2021/8999) and available at http://epbcnotices.environment.gov.au/referralslist/; and
- Meandu Mine King 2 East Project: MNES (Preliminary Documentation) Assessment Report EPBC 2021/8999 (WSP, 2023).

3 Assessment of impacts to animal breeding places

Assessment of potential impacts to animal breeding places and preparation of this High-risk SMP has been completed by suitably qualified and experienced persons. Details are presented in Table 3.1 below.

Table 3.1 Details of suitably qualified and experienced persons

Ecologist	Qualifications and experience	Task
Carla Meers Associate Ecologist	Bachelor Marine Studies (Hons) – Biology and Ecology 9 years' experience as an ecological consultant including preparation of High-risk SMPs, and Fauna Spotter-Catcher.	Breeding places survey, preparation of the High-risk SMP
Melanie Ashmore Senior Ecologist	Bachelor of Science – Ecology 8 years' experience as an ecologist including preparation and review of high-risk SMPs and conducting surveys animal breeding places.	Breeding places survey
Bastian Steinrucken Associate Ecologist	Master of Science – Biology (specialisation in Animal Ecology) 12 years' experience as an ecological consultant including preparation of High-risk SMPs, and Fauna Spotter-Catcher	Technical advice and review on the Impact Management Plan

Relevant CVs are provided in Appendix A.

3.1 Desktop assessment

The desktop assessment is contained within the K2E Project: Terrestrial Ecological Assessment (WSP, 2021), with further information provided in Section 3.3 of the K2E Project: MNES (Preliminary Documentation) Assessment Report (WSP, 2023).

3.1.1 Literature review

The desktop assessment involved a literature review of the species descriptions on the Queensland and Commonwealth Government's threatened species website for the threatened species revealed by database searches. In addition, previous ecological studies of the Study area were reviewed to identify potential threatened species relevant to the K2E Project.

To support the EA Amendment Application and EPBC Act Referral documentation, a literature review of the information sources outlined above, in conjunction with published studies, was prepared for the Black-breasted Button-quail. This literature review is Attachment G of the K2E Project: Terrestrial Ecological Report (WSP, 2021).

To inform the MNES (Preliminary Documentation) Assessment, WSP undertook an additional scientific literature review for the Black-breasted Button-quail. The primary focus of this review was to collate existing evidence as to the use (or otherwise) of Hoop Pine plantations by the Black-breasted Button-quail. The findings of this review are presented in Section 3.3.2 of the K2E Project: MNES (Preliminary Documentation) Assessment Report (WSP, 2023).

3.1.2 Database searches

Searches of the following databases were performed in respect of the Locality (10 km radius):

- Commonwealth DCCEEW *Protected Matters Search Tool* (PMST), to identify threatened fauna species and ecological communities listed under the EPBC Act that are predicted or known to occur in the Locality
- Queensland Government Wildlife Online database to identify threatened fauna species listed under the NC Act that have been previously recorded in the Locality
- DETSI species profile search to identify the locations of records for threatened fauna species listed under the NC Act
- Commonwealth Government-administrated Atlas of Living Australia to identify threatened fauna species listed under the NC Act
- regulated vegetation (including DETSI regional ecosystems and essential habitat mapping) to inform habitat values for threatened fauna species revealed by the above database searches.

3.1.3 Desktop findings

Database searches returned 41 fauna species listed as threatened and/or migratory under the NC Act and/or EPBC Act, as having been previously recorded or predicted to occur within the Locality, as presented in the K2E Project: Terrestrial Ecological Report (WSP, 2021).

Based on the presence of species recorded within the Locality and habitats identified within the Study area, a likelihood of occurrence assessment was conducted to determine those threatened fauna species with potential to occur within the Project area. The likelihood of occurrence assessment determined eight threatened, migratory or special least concern fauna species listed under the NC Act and/or EPBC Act, as having a moderate or higher likelihood of occurring in the K2E ASA, as detailed in Table 3.4.

3.2 Field assessment

3.2.1 Survey effort

Field surveys were conducted across the Study area to verify findings of the desktop assessment and confirm the presence/absence of MSES and/or MNES, and to identify those at risk of potential Project-related impacts from the K2E Project. Field surveys broadly encompassed the following:

- verification of the remnant status of vegetation communities and regional ecosystems
- verification of analogous regional ecosystem type of any high value regrowth (HVR) or other regrowth (non-remnant vegetation)
- identification of nationally threatened ecological communities (TECs) listed under the EPBC Act
- identification of threatened species and/or likely extent of their habitat in the Study area
- identification of terrestrial flora species; and
- identification of terrestrial fauna species.

Field surveys targeting fauna species were completed between August 2017 and January 2022, across 5 site visits and 2 motion camera surveys. An additional targeted breeding places survey was undertaken on 17–18 March, 2025, to support the preparation of this High-risk SMP. Survey effort is detailed in Table 3.2.

Surveys were conducted by WSP Australia Pty Ltd suitably qualified and experienced fauna ecologists. Detailed description methods and results relevant to the Project are presented in the K2E Project: Terrestrial Ecological Report (WSP, 2021), with further information provided in Section 3.4 of the K2E Project: MNES (Preliminary Documentation) Assessment Report (WSP, 2023).

Table 3.2 Field survey timing and effort (days)

Field survey events	Season	Timing	Survey effort
1 Fauna survey	Winter/dry	21–25 August 2017	5 days/4 nights
2 Fauna survey	Autumn/wet	19–23 March 2018	5 days/4 nights
3 Targeted Black-breasted Button-quail survey	Autumn/late wet	20–24 May 2019	5 days
4 Motion camera survey	Autumn-winter/ late wet-dry	May to August 2019	3 months
5 Fauna survey	Winter/dry	29 July 2019	1 day
6 Targeted fauna survey	Summer/wet	22–26 November 2021	5 days/4 nights
7 Motion camera survey	Summer/wet	November 2021 – January 2022	2 months
8 Targeted fauna breeding places survey	Summer/wet	March 2025	2 days

The seasonal fauna survey methods were developed with reference to the methods prescribed by the following Commonwealth and State fauna survey guidelines for the threatened fauna species of potential relevance to K2E Project:

- Commonwealth EPBC Act:
  - Survey guidelines for Australia's threatened bats (DEWHA, 2010)
  - Survey guidelines for Australia's threatened birds (DEWHA, 2010b)
  - Survey guidelines for Australia's threatened frogs (DEWHA, 2010c); and
  - Survey guidelines for Australia's threatened mammals (DSEWPaC, 2011)
- Queensland Government's Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre *et al*., 2018).

Targeted fauna surveys were performed in habitats likely to support the threatened fauna species identified by the initial likelihood of occurrence assessment as having a moderate or higher likelihood of occurring within the K2E ASA. Based on this assessment and the target species identified, pitfall trapping and Elliot trapping were determined to be unnecessary.

3.2.2 Survey results

The K2E Project contains a number of different fauna habitats and regional ecosystems, as presented in Table 3.3 and Figure 1.1.

Table 3.3 Fauna habitats and corresponding regional ecosystems and relevant areas of interest

Fauna habitat type	Corresponding regional ecosystem	Area of interest		Impact area (ha)	
		Study area	K2E ASA	Fence clear zone	K2E ASA
Semi-evergreen vine thicket and dry rainforest	RE 12.5.13c and RE 12.11.11	✓	✓	–	17.7
Hoop Pine plantation	Non-remnant	✓	✓	1.6	139.5
Juvenile hardwood plantation	Non-remnant	✓	✓	0.2	13.0
Exotic/native shrubby grasslands and bare earth tracks	Non-remnant	✓	✓	–	15.6
Total (ha) (rounded)				**1.8**	**185.8**

One hundred and fourteen fauna species were recorded within the Study area during the 2017 to 2019 field surveys, including 78 birds, 34 mammals (including 18 microbat species) and 2 reptiles. An additional 8 fauna species were recorded from the K2E ASA during the November 2021 field surveys, including 3 birds, 1 mammal, 3 frogs and 1 reptile. None of these additional species are of conservation significance. A complete fauna list is presented in Appendix D of the K2E Project: MNES (Preliminary Documentation) Assessment Report (WSP, 2023).

Four threatened species listed (at the time of EPBC Referral) under the EPBC Act and/or the NC Act were recorded within the K2E ASA, as presented in Table 3.4 and Figure 1.1.

The following microbat species were recorded within the Study area by harp traps or acoustic analysis using Anabat Express (Titley Scientific):

- White-striped Free-tail Bat (*Austronomus australis*)
- Gould's Wattled Bat (*Chalinolobus gouldii*)
- Chocolate Wattled Bat (*Chalinolobus morio*)
- Little Pied Bat (*Chalinolobus picatus*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Northern Long-eared Bat (*Nyctophilus bifax*)
- Gould's Long-eared Bat (*Nyctophilus gouldii*)
- Long-eared Bat species (*Nyctophilus sp.)* [2]
- Ride's Free-tailed Bat (*Ozimops ridei*)
- Eastern Horseshoe Bat (*Rhinolophus megaphyllus*)
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*)
- Western Broad-nosed Bat (*Scotorepens balstoni*)
- Little Broad-nosed Bat (*Scotorepens greyii*)
- Eastern Broad-nosed Bat (*Scotorepens orion*)
- Inland Forest Bat (*Vespadelus baverstocki*)
- Eastern Forest Bat (*Vespadelus pumilus*)
- Eastern Cave Bat (*Vespadelus troughtoni*)
- Little Forest Bat (*Vespadelus vulturnus*).

Estimations of the potential impacted habitat are provided in Section 5.1. Detailed descriptions of survey methods and results relevant to the Project are provided within the K2E Project: Terrestrial Ecological Assessment (WSP, 2021) and K2E Project: MNES (Preliminary Documentation) Assessment Report (WSP, 2023).

3.2.3 Targeted breeding places survey results

Searches for animal breeding places were conducted by suitably qualified and experienced Ecologists, with experience in the identification of habitat with the potential to support animal breeding places for threatened fauna species prescribed under the NC Act and/or EPBC Act and least concern (colonial breeding) fauna species, prescribed under the NC Act. Refer to Appendix A for the Study Lead's CV, which presents relevant experience and qualifications.

The animal breeding places identified during the field assessment and threatened species of relevance to this High-risk SMP include:

- Black-breasted Button Quail foraging and breeding habitat observed across site with distinctive foraging platelets in leaf litter and loose soil
- arboreal termitaria were found throughout the site. These habitat features are often excavated and used as breeding places by Lace Monitors, Laughing Kookaburras and other Kingfishers
- Brush Turkey nests were recorded in several locations, although none were actively being tended to by parents
- SEVTDR habitat providing breeding and foraging habitat for the Black-breasted Button-quail
- coarse woody debris and hollow logs within SEVTDR habitat acting as potential breeding and foraging habitat for the Spotted-tail Quoll
- coarse woody debris and hollow logs within SEVTDR habitat acting as breeding and foraging habitat for the Short-beaked Echidna
- SEVTDR habitat acting as breeding and foraging habitat for migratory and special least concern birds, including:
  - Rufous Fantail
  - Black-faced Monarch; and
  - Spectacled Monarch

[2] Long-eared Bat (*Nyctophilus sp.*) calls are indistinguishable between species. Therefore, a conservative approach is to leave the species identification at genus level.

- trees and stags containing hollows and decorticating bark providing roosting and breeding habitat for the least concern (colonial breeder) microbat species listed in Table 3.5.

The location of the recorded habitat features is presented in Figure 1.1. Detailed descriptions of impacts to specific habitat types are presented in Section 5.1.

Table 3.4 below details the threatened and special least concern fauna species recorded or assessed as having a moderate or high likelihood of occurring within the K2E ASA, based on results of the desktop and database search results and field verification surveys.

Table 3.4 Threatened and special least concern species listed under the NC Act assessed as having a moderate or high likelihood of occurrence or were recorded within the K2E ASA

Species name	Common name	Status		Likelihood of occurrence within the K2E ASA
		EPBC Act	NC Act	
Cuculus optatus	Oriental Cuckoo	M	SLC*	**High** Preferred habitat is present within the K2E ASA. However, species does not breed in Australia. Therefore, breeding behaviour and dependent juveniles are not at risk of Project-related risks.
Monarcha melanopsis	Black-faced Monarch	M	SLC*	**Recorded** Preferred habitat is present within the K2E ASA. Recorded within the K2E ASA during field survey.
Monarcha trivirgatus	Spectacled Monarch	M	SLC*	**High** Preferred habitat is present within the K2E ASA.
Ninox strenua	Powerful Owl	–	V	**Moderate** Potential foraging habitat is present within the K2E ASA. No suitable breeding habitat identified within the K2E ASA.
Rhipidura rufifrons	Rufous Fantail	M	SLC*	**Recorded** Preferred habitat is present within the K2E ASA. Recorded within the K2E ASA during field survey.
Turnix melanogaster	Black-breasted Button-quail	V	V	**Recorded** Preferred habitat is present within the K2E ASA. Recorded within the K2E ASA during field survey.
Dasyurus maculatus maculatus	Spotted-tail Quoll (SE mainland population)	E	E	**Moderate** Potential habitat within the K2E ASA.
Tachyglossus aculeatus	Short-beaked Echidna	–	SLC	**Recorded** Preferred habitat within the K2E ASA. Recorded within the K2E ASA during field survey.

Key: CE = Critically Endangered, E = Endangered, V = Vulnerable, SLC = Special least concern, M = Migratory
*Conservation status at the time of Project EPBC Referral

Table 3.5 details the 15 microbat species assessed as having a moderate or higher likelihood of occurring within the potential impact area (SEVTDR within the K2E ASA) based on the results of the database searches and field verification of habitats or were recorded during field surveys.

Table 3.5 Microbat species assessed as having a moderate or high likelihood of occurrence or recorded within the K2E ASA, breeding place and breeding season

Family	Species name	Common name	Likelihood of occurrence within potential Impact area (SEVTDR)	Animal breeding place	Breeding season
Molossidae	*Austronomus australis*	White-striped Free-tail Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows.	Female gives birth to single young December to late January. Young are independent February to March.
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows.	Female gives birth to single young or twins September to December. Young are independent January to February.
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows.	Female gives birth to single young October to February. Young are independent by February.
Vespertilionidae	*Chalinolobus picatus*	Little Pied Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows.	Female gives birth late November to early December. Young are independent January.
Vespertilionidae	*Miniopterus australis*	Little Bent-winged Bat	**Recorded** Calls recorded in potential impact area. Although recorded during field surveys, breeding habitat is absent from the K2E ASA and will not be considered further in this High-risk SMP.	Roosts and breeds in old mines, caves, tunnels, culverts, bridges and sometimes buildings.	Females give birth to single young in November. Young are independent December to January.
Vespertilionidae	*Nyctophilus bifax*	Northern Long-Eared Bat	**Recorded** during field surveys	Roosts and breeds in tree hollows, loose bark, tree crevices and sometimes buildings.	Females can give birth to twins in late October and November. Young are independent December to January.
Vespertilionidae	*Nyctophilus gouldii*	Gould's Long-Eared Bat	**Recorded** during field surveys	Roosts and breeds in tree hollows, loose bark, tree crevices and sometimes buildings.	Females can give birth to twins in late October and November. Young are independent December to January.
Vespertilionidae	*Nyctophilus sp.**	Long-eared Bat species	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows, loose bark, tree crevices and sometimes buildings.	Females can give birth to twins in late October and November. Young are independent December to January.
Molossidae	*Ozimops ridei*	Ride's Free-tailed Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows and sometimes buildings.	Female gives birth to single young October and November. Young are independent December to January.

Family	Species name	Common name	Likelihood of occurrence within potential Impact area (SEVTDR)	Animal breeding place	Breeding season
Vespertilionidae	*Rhinolophus megaphyllus*	Eastern Horseshoe Bat	**Recorded** Calls recorded in potential impact area. Although recorded during field surveys, breeding habitat is absent from the K2E ASA and will not be considered further in this High-risk SMP.	Roosts in caves, culverts, rock overhangs or old mines shafts. Females will return to the same maternity roost every year.	One young is born in October to November. Young are independent December to January.
Vespertilionidae	*Saccolaimus flaviventris*	Yellow-Bellied Sheathtail Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows.	Breeding occurs in August and single young is born between December and March. Young are independent April to early May.
Vespertilionidae	*Scotorepens balstoni*	Western Broad-nosed Bat	**Recorded** Calls recorded in potential impact area.	Females form maternity colonies in tree hollows.	Females give birth to a single young in January. Young are independent February to March.
Vespertilionidae	*Scotorepens greyii*	Little Broad-nosed Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows and sometimes buildings.	Female gives birth to twins in October to November. Young are independent December to January.
Vespertilionidae	*Scotorepens orion*	Eastern Broad-nosed Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows and sometimes buildings.	A single young is born in late November or early December. Young are independent January to February.
Vespertilionidae	*Vespadelus baverstocki*	Inland Forest Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in tree hollows and sometimes buildings.	Females become pregnant in November, gather to form maternity colonies and a single young is born in December. Mothers carry young for the first week but they are independent by January.
Vespertilionidae	*Vespadelus pumilus*	Eastern Forest Bat	**Recorded** Calls recorded in potential impact area.	Roosts and breeds in small to large hollows.	Female gives birth to twins (generally) in October to November. Young are independent December to January.
Vespertilionidae	*Vespadelus troughtoni*	Eastern Cave Bat	**Recorded** Calls recorded in potential impact area. Although recorded during field surveys, breeding habitat is absent from the K2E ASA and will not be considered further in this High-risk SMP.	Roosts in caves, rocky overhangs or old mines shafts.	Pregnant females have been observed in November.
Vespertilionidae	*Vespadelus vulturnus*	Little Forest Bat	**Recorded** Calls recorded in potential impact area.	Roosts in trees, particularly stags.	A single young is born in October–November. Young are independent December to January.

* calls within *Nyctophilus* genus are indistinguishable. Due to species distribution, it is likely *N. bifax, N. gouldii* or *N. geoffroyi*.

Habitat assessments and targeted surveys identified a number of habitat types and micro-habitat features that are likely to be utilised by both threatened and least concern fauna species, including:

- arboreal hollows
- burrows
- rock or boulder piles
- arboreal and terrestrial termitaria
- coarse woody debris; and
- dense leaf litter.

3.2.4 Survey timing and limitations

The K2E Project: Terrestrial Ecological Assessment (WSP, 2021) and MNES (Preliminary Documentation) Assessment (WSP, 2023) relied on publicly available information and data, and that provided by TEC Coal. It focused on ecological values that have been field verified as present or identified as potentially occurring within the Study area. The likelihood of occurrence assessment relied on database searches and publicly available information that relate to the K2E ASA and Locality.

The field surveys targeted those threatened fauna species either previously recorded in the Study area or assessed as having a moderate or high likelihood of occurrence in the Study area, based on the initial desktop assessment and field survey results. The breeding places assessment was undertaken 17–18 March 2025 during relatively warm and wet conditions.

The field survey focused on the identification of threatened species and habitats that may be at risk of potential impacts as a result of the K2E Project. The fauna surveys were undertaken over three seasonal survey events (dry and wet season) to gain a greater understanding of seasonal variation (refer Section 3.2).

4 Applicable species profiles

4.1 Black-breasted Button-quail

4.1.1 Conservation status

The Black-breasted Button-quail (*Turnix melanogaster*) is listed as vulnerable under the EPBC Act and the NC Act.

4.1.2 Description

The Black-breasted Button-quail is a large, plump, pale-eyed and sexually dimorphic bird (Marchant & Higgins, 1993). Females are larger than males and have a black head and breast with white half-moon markings across the upper-breast and a chestnut marbled upper covered in black ladder markings with white streaks (Pizzey & Knight, 1997). Males have white markings on the face and neck covered with fine black dots and the upper-breast is a mottled chestnut and black (Pizzey & Knight, 1997). Both sexes have grey bills, white-cream eyes and yellowish legs and feet (Pizzey & Knight, 1997).

4.1.3 Distribution and habitat

The Black-breasted Button-quail is restricted to forests and rainforests, and prefers drier low closed rainforests, particularly:

- semi-evergreen vine thicket
- low microphyll vine forest
- Araucarian microphyll vine forest; and
- Araucarian notophyll vine forest (DCCEEW, 2023).

The species occurs predominantly in areas with 770–1200 mm rainfall per annum. The optimum habitat generally occurs on areas containing highly fertile soils with a deep leaf litter layer, which is crucial for foraging requirements. Fallen logs and a dense shrub layer are also considered to be important habitat requirements for shelter and breeding (DCCEEW, 2023).

The National Recovery Plan for the Black-breasted Button-quail (Mathieson and Smith, 2009) notes that the Black-breasted Button-quail is most frequently reported from:

- vine thickets and rainforest vegetation types that are periodically water-stressed. These include: semi-evergreen vine thicket, low microphyll vine forest, Araucarian microphyll vine forest, Araucarian notophyll vine forest and Brachychiton scrubs that may incorporate bottle trees (*Brachychiton* spp.), Brigalow (*Acacia harpophylla*) and Belah (*Casuarina cristata*) (Flower et al. 1996)
- low thickets or woodlands with a dense understorey but little ground cover, typically dominated by Acacia (Flower et al. 1996)
- in littoral situations, dry vine scrubs, acacia thickets and areas densely covered in shrubs, particularly Midgen Berry *Austromyrtus dulcis* (Marchant & Higgins 1993)
- regrowth of the above vegetation groups, in most cases adjacent to intact remnants
- patches of the introduced weed *Lantana camara*, particularly when associated with the above vegetation types
- Hoop Pine plantations where there is a dense understorey, usually comprised of the introduced weed *Lantana camara* and then, generally adjacent to the above-listed forest types; and
- wetter subtropical rainforest sometimes in association with moist eucalypt forest in NSW (Garnett & Crowley 2000). Milledge's (2000) report indicates that they may prefer drier rainforests, although studies from NSW are not conclusive.

4.1.4 Ecology

The breeding season occurs from September to May, during which three to five eggs are laid (Garnett *et al*., 2011; Smyth and Young, 1996). The female can lay two clutches of eggs 8–10 days apart (Smyth & Young, 1996). Nests consist of a scrape in the ground, lined with leaves, grass or moss. Nests are well-concealed and placed in the buttress root of a tree or sapling, the base of a fern or under a low bush or grass tussock (Marchant & Higgins, 1993; Smyth & Young, 1996). The incubation period in the wild is 18–21 days and the male incubates the eggs (Marchant & Higgins, 1993; Smyth & Young, 1996). Young Black-breasted Button-quail are independent after 4–5 weeks. They are primarily insectivorous, and forage in leaf litter on the forest floor (Marchant & Higgins, 1993; McConnell & Hobson, 1995). Their feeding behaviour creates platelets on the ground by pivoting in a circle on one leg scratching away the leaf litter with the other leg.

4.1.5 Threats

The threats for the Black-breasted Button-quail currently listed in the Species Profile and Threats Database (SPRAT) are:

- habitat loss and fragmentation caused by massive clearance of forests for agriculture and forestry (including ongoing timber harvesting), particularly clearing of forests on highly fertile soils
- grazing, trampling and other disturbances caused by cattle, horses and feral pigs around fragmented habitats
- frequent control burning of dry rainforest remnants, as it reduces the leaf litter layer
- agricultural intensification and plantation management (clearing, slashing and burning) in remnant vine forests adjacent to Hoop Pine plantations
- predation by cats, foxes and pigs on birds and nests; and
- urban development where suitable habitat occurs on the outskirts of population centers, due to the shy nature of the species (DCCEEW, 2023).

4.2 Spotted-Tail Quoll

4.2.1 Conservation status

The Spotted-tail Quoll (*Dasyurus maculatus maculatus*) (SE mainland population) is listed as endangered under the NC Act and EPBC Act.

4.2.2 Description

The Spotted-tail Quoll is a cat-sized, carnivorous marsupial with fawn fur and distinctive white spots over its back and tail (Cronin 1991; Edgar & Belcher 2008). Males are 380–759 mm in head and body length, and females are 350–450 mm. Males weigh up to 7 kg and females up to 4 kg (Edgar & Belcher 2008) although the mean weight range for male adults is 2.8–4.6 kg and 1.5–2 kg for females (Belcher 2003; Green & Scarborough 1990; Jones 1997; Körtner *et al*. 2004). Whilst primarily nocturnal, they are active during the day in the colder parts of the year.

4.2.3 Distribution and habitat

The Spotted-tail Quoll (SE mainland population) occurs in eastern Australia from south-east Queensland to western Victoria. Populations are fragmented and estimates of decline range from 50–90 % throughout its remaining distribution.

The Spotted-tail Quoll is a forest dependent species but occurs in a variety of habitats including closed forests, tall eucalypt forests, open woodlands and open forests. They rely heavily on complex habitat that contains high densities of logs, rock/boulder piles, burrows or tree hollows for denning and breeding habitat (Woinarski *et al*. 2014).

4.2.4 Ecology

Spotted-tail Quolls are solitary animals (Todd *et al*. 2007) that occur at low densities (Körtner *et al*. 2015) and have large home ranges of up to a few thousand hectares in size. The Spotted-tail Quoll's home range varies depending on the quality of habitat and abundance of prey items. They feed on a wide variety of prey including mammals, birds, reptiles, fish, amphibians and invertebrates. Whilst they are capable hunters, they will readily feed on carrion.

Breeding occurs annually, and females will generally produce a litter of five between May and August. Females rely heavily on secure dens such as large logs or boulder piles to rear young. The young are left behind in the nursery den while the mother forages. Young quolls become independent after approximately three months.

4.2.5 Threats

Listed threats for the Spotted-tail Quoll include:

- land clearing and habitat modification
- timber production and plantations
- vehicle strike
- predation and competition by feral foxes and cats.
- mortality caused by ingestion of Cane Toads (*Rhinella marina*)
- non-target poisoning associated with non-native predators
- frequent fire decreasing habitat complexity; and
- purposeful killing due to human/carnivore interaction.

4.3 Short-Beaked Echidna

4.3.1 Conservation status

The Short-beaked Echidna (*Tachyglossus aculeatus*) is listed as special least concern under the NC Act.

4.3.2 Description

The Short-beaked Echidna is widespread and found throughout most habitats in Australia, including alpine and arid regions.

Short-beaked Echidna are typically 30–45 cm in length with a 75 mm snout, and weigh between 2–7 kg. The body is covered in cream-coloured keratinous spines which may be up to 50 mm long, with brown fur present between the spines.

4.3.3 Distribution and habitat

The Short-beaked Echidna is primarily insectivorous, preferring ants and termites, and can live anywhere with sufficient and long-term foraging resources. Higher densities of the Short-beaked Echidna are found in heavily vegetated areas containing termite-filled logs and terrestrial termite mounds (Sprent & Nicol, 2012). However, they are prevalent in all terrestrial habitats including the Australian Alps and the Central Deserts. They also occur in agricultural areas containing uncleared scrub, grasslands and the outer suburbs of urban areas (Bush Heritage, 2021).

They are not territorial and have a mean home range size between 40–60 ha. Their home range size is heavily dependent on habitat and foraging resources and may overlap with other individuals (Sprent & Nicol, 2012).

The Short-beaked Echidna has been found to be active throughout the day and night. Nocturnal and crepuscular activity is likely to avoid extreme heat during the wet season or within arid or semi-arid regions. When not foraging, they will shelter by digging down into the soil, excavations created in termite mound or utilise fallen logs. Their diet predominately consists of termite and ants; however, they will feed on beetle larvae, beetles and earthworms (Sprent & Nicol, 2016). Common signs of species include 'rings' around trees and logs, indicating foraging, or smooth cylindrical faeces consisting primarily of insect remains.

4.3.4 Ecology

Short-beaked Echidnas are solitary animals, and only interact during the breeding season for courtship pursuits and mating. Breeding occurs between June and September and is heavily influenced by geography and climatic factors. Females will lay one egg a year, which is transferred directly into a small, backwards facing pouch on the abdomen where the egg hatches (Rismiller & McKelvey, 2000). A nursery burrow is constructed for breeding, as a short single entrance tunnel dug into the ground. The young remain in the nursery burrow until they are 6 months old, when they leave and have no further contact with the mother.

4.3.5 Threats

Listed threats for the Short-beaked Echidna include:

- vehicle strike
- habitat destruction caused by land clearing and the removal of fallen timber (grubbing)
- predation by feral predators including foxes and cats; and
- fatal infection by the parasitic tapeworm *Spirometra erinaceieuropaei,* transmitted to drinking water by dogs, cats and foxes (Bush Heritage, 2021, Scheelings, 2016).

4.4 Rufous Fantail

4.4.1 Conservation status

The Rufous Fantail (*Rhipidura rufifrons*) is listed as special least concern under the NC Act and migratory under the EPBC Act.

4.4.2 Description

The Rufous Fantail is a small, active bird with a distinctive reddish-brown rump and continuously fanned tail. The crown, face, neck and shoulders are grey-brown, shading to reddish brown on the lower back, rump and upper tail. The brow is rufous, the chin and throat are white, grading into a black and white breast, and the rest of the underparts are white tinged red-brown. The wings are grey-brown and the tail feathers have red-brown bases. Young birds are similar, but duller, with less distinct markings on the breast (Birdlife, 2021a).

4.4.3 Distribution and habitat

The Rufous Fantail is found in northern and eastern Australia. In Autumn in southern Queensland, New South Wales and Victoria, it migrates north to north Queensland and New Guinea. It prefers rainforest, dense moist forest, swamp woodlands and mangroves and can often be found low to the ground. During the eastern population migration, it can be found in more open and urban habitats.

4.4.4 Ecology

The breeding season of the Rufous Fantail occurs from spring, with most eggs laid between November and December (Higgins *et al.* 2006). Two to four eggs are laid in a small cup-shaped nest in a tree, shrub or vine from ground up to 6 meters high. The incubation period is 15–17 days and young are fully independent after 4–5 weeks (Birdlife, 2021a).

4.4.5 Threats

Listed threats for the Rufous Fantail include:

- habitat destruction associated with land clearing and urbanisation.

4.5 Black-faced Monarch

4.5.1 Conservation status

The Black-faced Monarch (*Monarcha melanopsis*) is listed as special least concern under the NC Act and migratory under the EPBC Act.

4.5.2 Description

The Black-faced Monarch has a distinctive black face that does not extend across the eyes, grey upperparts, wings and upper breast, contrasting with a rufous stomach. The eye has a black eye ring and an area of pale grey surrounding it. The blue-grey bill has a hooked tip. Young birds are similar but lack the black face, have a black bill and tend to have a brownish body and wings (Birdlife, 2021b).

4.5.3 Distribution and habitat

The Black-faced Monarch has been recorded along the coast of eastern Australia and prefers rainforests, eucalypt woodlands, coastal scrub and damp gullies. During its migration from wintering grounds in southern New Guinea to their summer breeding areas in eastern Australia they have been recorded in open woodlands (Birdlife, 2021b).

4.5.4 Ecology

Breeding generally occurs from October to February, when two to three eggs are laid. Both male and female incubate the eggs for a period of 15 days. Nests are built with bark, roots, casuarina needles, moss and spider webs in the fork of a tree approximately 3–6 m above the ground (Birdlife, 2021b).

4.5.5 Threats

Listed threats for the Black-faced Monarch include:

- habitat destruction caused by land clearing; and
- habitat destruction and degradation caused by wildfires.

4.6 Spectacled Monarch

4.6.1 Conservation status

The Spectacled Monarch (*Symposiachrus trivirgatus*) is listed as special least concern under the NC Act and migratory under the EPBC Act.

4.6.2 Description

The Spectacled Monarch is blue-grey above, with a black face mask that extends across both eyes, rufous breast, white underparts and a black tail with white outer tips. Immature birds lack the black face and have a grey throat (Birdlife, 2021c).

4.6.3 Distribution and habitat

The Spectacled Monarch is found along coastal north-eastern and eastern Australia, including islands from Cape York, Queensland. It prefers rainforests, wet gullies and waterside vegetation with thick understorey, however, it may be found in open woodlands when migrating (Birdlife, 2021c).

4.6.4 Ecology

The Spectacled Monarch is a resident species in the north of its range. However, it is a summer breeding migrant to coastal south-eastern Australia, arriving in September and returning north in March. It builds a small cup nest of fine bark, plant fibres, moss and spider webs in tree forks or hanging vines approximately 1–6 m from the ground (Birdlife, 2021c).

4.6.5 Threats

Listed threats for the Spectacled Monarch include:

- habitat destruction caused by land clearing; and
- habitat modification due to invasive vines, including *Cryptostegia grandiflora* (Rubber Vine) in riparian habitat.

4.7 Microbats

The 15 species of Yangochiropteran Bats (microbats) as listed in Table 3.5 and in Section 4.7.2 are relevant to this High-risk SMP.

4.7.1 Conservation status

These species are listed as least concern (colonial breeders) under the NC Act.

4.7.2 Species group description

The suborder Yangochiroptera consists of the multiple families of bats, commonly referred to as microbats. Relevant families to this High-risk SMP include Molossidae – free tailed bats and Vespertilionidae – vesper or night bats. The family into which each of the for each of the relevant species of microbat belongs is outlined in Table 3.5.

4.7.3 Distribution and habitat

The 15 microbat species covered in this High-risk SMP are those listed as least concern (colonial breeders) under the NC Act and widely distributed throughout Australia and/or Queensland.

4.7.4 Breeding habitat

Microbats are dependent on animal breeding places in hollow bearing trees, stags, under bark, tree crevices, rock crevices and co-exist in close associations for breeding purposes (maternity roost). They are also commonly found roosting in buildings, culvert and bridges. Microbat species can be found roosting alone, however they can form colonies containing a few individuals to several hundred individuals, and colonies may contain a mixture of species. Most forest microbats roost in hollows bearing trees or stags and may use several roost sites regularly in high quality vegetation containing a high density of suitable roosts. Maternity roosts may be used inter-generationally for several years and are extremely valuable to the survival of local populations (Goldingay, 2009).

4.7.5 Ecology

Microbats are nocturnally active, and use echolocation to navigate and hunt, and are primarily insectivorous.

Despite their small size and high metabolism, microbats are long lived animals that are slow to develop to sexual maturity, have longer pregnancies and a low rate of fecundity. Female microbats spend vast amounts of energy rearing young and roost disturbance can potentially lead to mortality in mothers and/or young. Generally, microbats breed in late spring to summer (September to February), when food availability is highest, and typically give birth once a year in between November and December, depending on the species. Young remain with the female for 4–6 weeks before weaning and are independent by April (Churchill, 2008).

4.7.6 Threats

Threats listed for microbats include habitat loss and disturbance of roost sites, primarily caused by:

- clearing of vegetation
- inappropriate fire regimes; and
- invasion of weeds (DES, 2019).

Given the abundance of microbats recorded within the K2E ASA, the presence of potential breeding habitat in the K2E ASA cannot be discounted. Potential impacts from the K2E Project include:

- direct mortality during vegetation clearing
- direct loss of available breeding habitat including
  - hollow bearing trees
  - tree crevices/cracks
  - loose bark
  - stags
- stress to individuals leading to abandonment or loss of young due to increased vibrations and noise levels caused by Project works; and
- increased vibration and noise levels caused by Project works disputing breeding behaviour.

4.8 Applicable species breeding seasons

A summary of the applicable species breeding seasons is presented below in Table 4.1. Terminology used within this summary includes:

- *Microbats* – due to the similarity in microbat breeding seasons and the number of microbat species, all microbat species are represented in one row with an average time frame for reproduction periods used
- *Breeding season* – the period of time when mature individuals are engaged in mating behaviour, including egg laying, nesting or denning[3]
- *Dependent juveniles* – the period of time when juveniles are reliant on their parents
- *Seasonally present* – species is present due to migration seasonality; and
- *Recommended works period* – the period of time that contains no breeding behaviour, juveniles are fully independent or species has migrated outside of the Locality.

The SEVTDR clearing works relevant to this High-risk SMP are recommended to occur between June and August, when breeding activity for the majority of applicable species is limited and juveniles from the previous breeding season have become independent.

[3] Breeding seasons are highly dependent on environmental factors including but not limited to recent rain, temperature and overall climate. Breeding seasons are taken from publicly available resources and may not represent the true breeding period for applicable species within the K2E ASA.

Table 4.1 Applicable species breeding season calendar

Common name	Species name	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Black-breasted Button-quail	*Turnix melanogaster*												
Spotted-tail Quoll	*Dasyurus maculatus*												
Short Beaked Echidna	*Tachyglossus aculeatus*												
Rufous Fantail	*Rhipidura rufifrons*												
Black Faced Monarch	*Monarcha melanopsis*												
Spectacled Monarch	*Symposiachrus trivirgatus*												
Microbats													

Table Key	Seasonally present	Breeding season	Dependent juveniles	Non-breeding season

5 Impact management plan

5.1 Nature of impact

The K2E Project will result in direct impacts upon fauna habitats that may support animal breeding places relevant to the species applicable to this High-risk SMP. Through these direct impacts the K2E Project has the potential to impact upon animal breeding places and potentially result in a high risk of injury to least concern and threatened species.
The identified direct impacts and potential impacts upon animal breeding places are presented in the following sections. The impact mitigation and management measures are presented in Section 5.2, Section 5.3 and Table 5.2.

The K2E Project is predicted to result in residual impacts to remnant habitats of specific value to applicable species, as presented in Table 5.1. The Hoop Pine plantation along with the juvenile mixed hardwood plantation are essentially monocultures, with low environmental value when compared to the previously cleared vegetation communities and provide limited habitat value (particularly breeding habitat) for MSES and/or MNES. The Hoop Pine plantation was harvested by HQPlantations Pty Ltd (HQPlantations) in 2022 in accordance with its Plantation Licence. Subsequently, Hoop Pine plantation and juvenile hardwood plantation habitat types are not discussed further in this High-risk SMP.

Table 5.1 Predicted Project-related impacts upon High-risk SMP fauna habitat types in the K2E ASA

Fauna habitat types	Corresponding regional ecosystem		Applicable species	Impact (ha)	
	ID	Short description		K2E ASA	Fence clear zone
Semi-evergreen vine thicket and dry rainforest	RE 12.5.13c	Low microphyll vine forest and semi-evergreen vine thicket with emergents on deeply weathered remnant Tertiary surfaces	— Black-breasted Button-quail — Spotted-tail Quoll — Short-beaked Echidna — Rufous Fantail — Black-faced Monarch — Spectacled Monarch — microbats	16.7	–
	RE 12.11.11	Microphyll to notophyll vine forest +/- *Araucaria cunninghamii* on interbedded volcanic		1	–
Hoop Pine plantation (1)	Non-remnant	Monoculture of Hoop Pine, with some native shrub and tree species present in the understorey.	3.2 ha of Hoop Pine plantation buffer zone habitat provided only marginal supplementary foraging/refuge habitat for the population of Black-breasted Button-quail resident in the adjacent SEVTDR. This Hoop Pine plantation buffer zone habitat was not breeding habitat.	139.5	1.6
Juvenile hardwood plantation	Non-remnant	Monoculture of immature regrowth trees with limited structural and habitat values for native fauna.	–	13.0	0.2
Exotic/native shrubby grasslands and bare earth tracks	Non-remnant	The exotic/native shrubby grasslands and bare earth tracks with a relatively high abundance of exotic flora species.	–	15.6	–
Total (ha) (rounded)				**185.8**	**1.8**

Table Key: LC – Least concern, E – Endangered, X – Category X

(1) The Hoop Pine plantation, including the buffer area, was harvested in 2022 as part of the usual operations of HQPlantations (i.e. not related to the K2E Project). The Hoop Pine plantation was mature and due for harvesting.

5.1.1 Direct impacts

Direct impacts are areas where ground disturbance and clearing of vegetation and habitats will occur. Direct impacts are permanent residual impacts, which are in the most part unavoidable. The potential direct impacts that may result from construction activities and/or the operational phase of the Project have been identified below.

5.1.1.1 Vegetation clearing and habitat loss

Field surveys in combination with a likelihood of occurrence assessment identified the following species of conservation significance as potentially having breeding places in the Project Area:

- Black-breasted Button-quail
- Short-beaked Echidna
- Black-faced Monarch
- Rufous Fantail
- Spectacled Monarch
- Spot-tailed Quoll
- Microbats.

The vegetation within the Project Area provides suitable habitat for these species as presented in Table 5.1, with a total direct impact area of 17.7 ha.

5.1.1.2 Wildlife interactions

Fauna injury or death has the greatest potential to occur during vegetation clearing activities. Some mobile species, such as birds, including the Black-breasted Button-quail, may be able to move away from the path of clearing and may not be greatly affected unless they are nesting. However, other species that are less mobile (ground dwelling reptiles and mammals), or those that are nocturnal and/or nest or roost in tree hollows during the day (arboreal mammals, parrots and microbat species), may find it difficult to escape roosts and may not be able to relocate their dependent offspring with them.

5.1.2 Potential indirect impacts

Indirect impacts occur when Project-related activities affect animal breeding places in a manner other than a direct loss or clearing. Examples of indirect impacts include promotion of soil erosion, sedimentation of waterways, dust inhibiting plant pollination, provision of suitable seed bed for invasive plants, or increased noise activity within or directly adjacent to sensitive habitat areas.

Potential indirect impacts to animal breeding places that may result from construction activities and/or the operational phase of the Project have been identified below.

5.1.2.1 Weed invasion and colonisation

Weed species are established throughout the Project Area, especially Lantana (*Lantana camara*). Activities associated with the Project have the potential to disperse weeds into surrounding areas. Weeds have can potentially overgrow available habitat areas rendering them unusable for breeding purposes.

The most likely causes of weed dispersal associated with the Project include earthworks, movement of soil and attachment of seed (and other propagules) to vehicles and machinery. This is an indirect impact that may reduce habitat quality. However, it should be recognised that much vegetation within and adjacent to the Project Area, already has considerable weed infestation. Therefore, the overall current extent of habitat modification from weed invasion is not likely to increase extensively because of the Project.

5.1.2.2 Pest animals

Three species of introduced pest animal were recorded during previous ecological surveys in the surrounding areas; feral dog, feral cat and Red Fox. Many invasive animal species predate on native animals and have the ability to excavate nesting burrows, prey on ground-nesting birds etc.

While the Project activities, particularly vegetation clearing, have the potential to disperse pest animal species out of the areas of disturbance across the surrounding landscape, it is highly likely that pest animal species recorded in the area already occupy habitats in the Locality. Therefore, the risk of the Project resulting in the establishment of these pest animal species in areas where they are currently absent is assessed as low.

5.2 Species specific management strategies

This section of the High-risk SMP identifies the management actions to be applied to avoid or minimise impacts of removing or altering animal breeding places for the applicable species. The overall potential extent of impact to the breeding places for the applicable species (tree hollows and decorticating bark, deep leaf litter, coarse woody debris and logs) is high within the 17.7 ha of SEVTDR habitat (refer to Table 5.1), considering:

- multiple Black-breasted Button-quail records within the K2E ASA during field surveys. This species is highly dependent on SEVTDR habitat, as it supports all of the species life cycle requirements (foraging, roosting, breeding and dispersal)
- the high-quality habitat within the SEVTDR acting as potential denning and foraging habitat for the Spotted-tail Quoll (although this species was not recorded within the K2E ASA or the Study area and is considered unlikely to be present)
- multiple Short-beaked Echidnas recorded within the K2E ASA during field surveys. This species is highly likely to utilise the abundant coarse woody debris in SEVTDR habitat to den and raise young
- the presence of migratory birds utilising SEVTDR habitat as seasonal breeding habitat
- the potential for hollow bearing trees, stags, tree crevices and loose bark within the SEVTDR habitat acting as microbat breeding habitat
- the abundance and high diversity of microbat species within the K2E ASA recorded during Anabat surveys
- the importance of microbat maternity roost (animal breeding places) to local microbat populations.

Consideration of the above factors has informed the necessary impact mitigation and management measures to be applied to animal breeding places for the applicable species. A description of the animal breeding places that may occur in the K2E ASA for each applicable species is provided in the following sections. This has informed the appropriate and reasonable management and mitigation measures to be implemented during pre-clearing, clearing and post-clearing activities within the SEVTDR for the K2E Project.

5.2.1 Schedule of works and sequential clearing

The clearing of the SEVTDR habitat is proposed to be undertaken in two to three stages, with several years (likely > 2 years) between clearing stages. The staged clearing aligns with mine planning and ensures that SEVTDR habitat is not cleared until it is necessary for mining operations.

Clearing of SEVTDR habitat will involve the following Stages (refer Figure 5.1):

- Area 1: Stage 1 – Section of the SEVTDR habitat that runs parallel to Ridge Road. Clearing to commence in the south and progress towards the retained SEVTDR in the north.
- Area 2: Stage 2 – East-west section of SEVTDR. Clearing to commence in the west and progress towards the east.
- Area 3: Stage 3 (if required) – Remaining areas of SEVTDR habitat (including the 1.0 ha small ‘triangle’ of dry rainforest habitat to the south of the east-west section of SEVTDR) within the K2E ASA that require clearing. If Stage 1 and 2 clear all of the SEVTDR in the K2E ASA that is required to be cleared then Stage 3 will not be required.

In each clearing episode, clearing will commence in areas closest to the approved surface rights area and flush fauna towards adjoining habitat areas (native vegetation areas) within the Yarraman State Forest (refer Figure 5.1). The boundary between the remnant vegetation areas within the K2E ASA and the adjacent remnant vegetation areas within the Yarraman State Forest will not be fully fenced to allow wildlife egress from the K2E ASA during clearing operations.

The clearing of the SEVTDR habitat will be undertaken during the dry season between June and August.

5.2.2 Summary of management measures

A summary of management measures to be applied to the applicable species' habitat relevant to this High-risk SMP (i.e. the 17.7 ha of SEVTDR habitat referenced in Figure 5.1 and Table 5.1) are outlined below:

- Vegetation clearing of the SEVTDR habitat will occur between June – August (refer to Table 4.1).
- A pre-clear survey of SEVTDR habitat will be undertaken within the 14 days prior to clearing works commencing.
- Plant undertaking clearing within the SEVTDR habitat will be of an appropriate size and type for the vegetation to be cleared, including the following:
  - excavators will use appropriate attachments while clearing habitat trees, such as a ripper, grabs, tree harvester attachments, or other suitable attachments
  - only operators skilled and experienced in removing habitat trees with a tree harvester will operate an excavator with a tree harvesting attachment
  - no mulching heads or mulching head attachments for clearing plant will be utilised for clearing of the SEVTDR habitat.
- Bulldozers are not recommended for initial clearing of the SEVTDR habitat due to the number and nature of applicable species.
- Excavators, dozers, or other appropriate plant may windrow or stockpile cleared vegetation as clearing progresses, and mulching of the cleared vegetation using any appropriate mulcher can only occur following inspection by the Spotter Catcher. The vegetation on the ground (stockpiled, windrowed, or otherwise) will be inspected by a Spotter Catcher, and the 'ok to mulch' given once the Spotter Catcher deems that wildlife has been adequately managed for that cleared vegetation.
- The Spotter-catcher(s) will perform daily rapid Black-breasted Button-quail and Migratory Bird nest surveys in the SEVTDR habitat expected to be cleared within 12 hours.
- Clearing of the SETDR habitat will occur in the sequential manner detailed in Section 5.2.1 above.

Procedures, management actions, roles and responsibilities for each phase of clearing are detailed in Table 5.2.

Meandu Mine – K2E Project Species Management Program

Figure 5.1
Pre-mining vegetation clearing activities

D RP888417
EMT RP888421
20 RP888421
1 SP138386
E RP888417
L RP889135
F RP888419
2 RP169258
3 RP176969
10 SP305494
Yarraman State Forest
289 FTY1859
437 CSH757
449 CSH757
450 CSH757
451 CSH757
Area 1
Area 2 / Area 3
RIDGE ROAD
ML 6674

June to August (from 2026)
TEC Coal clear and mulch the vine forest in the K2E ASA (part of proposed action)

(2026 - 2027)
TEC Coal to clear juvenile hardwood plantation

2022 to 2023
HQPlantations harvest for Hoop Pine Plantation (not part of proposed action)

Proposed action – K2E ASA (186 ha)

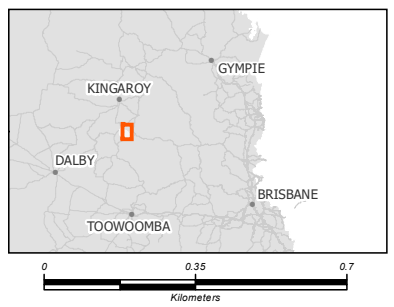
Proposed action – K2E ASA (186 ha)

Legend

- Direction of clearing
- Old Feeder 831 Transmission Line location
- Ridge Road
- Cadastre
- Fence Clear Zone
- Proposed action (K2E ASA)
- Mining Lease (ML6674)
- Approved Surface Rights Area
- Yarraman State Forest
- Ridge Road Closure

Vegetation Clearing

- Existing Cleared Area
- Clearing of Hoop Pine Plantation (HQPlantation) (not part of proposed action)
- Clear and/or mulch juvenile hardwood plantation (TEC Coal)
- Clear and mulch vine forest (17.7 ha)



Coordinate system: GDA 1994 MGA Zone 56
Scale ratio correct when printed at A3
1:17,500 Date: 29/05/2023

Data sources: - DNRME, TMR, Translink, Geoscience Australia

C:\Users\AUAC507280\WSP O365\AU-WKG - Geospatial - AIS - Documents\Projects\PS121591_K2EHighRiskSMP\Mxd\PS121591_Fig5-1_PreMining_Vegetation_Clearing_r1v1.mxd

5.2.3 Black-breasted Button-Quail

Approximately 17.7 ha of Black-breasted Button-quail habitat suitable for potential animal breeding places for the species will be impacted by the clearing of SEVTDR habitat for the K2E Project (refer Table 5.1). The SEVTDR habitat within the K2E ASA supports all life cycle requirements for the species including:

- deep and continuous leaf litter for foraging; and
- complex habitat containing mature trees and rock piles for building nests and breeding behaviour.

Photo 5.1 Black-breasted Button-quail pair within K2E ASA

Photo 5.2 Black-breasted Button-quail platelets within K2E ASA

Camera trap and bird surveys revealed that Black-breasted Button-quail were present throughout the SEVTDR habitat Photo 5.1). Black-breasted Button-quails were also confirmed through the abundance of platelets within SEVTDR habitat (refer to Section 4.1 and Photo 5.2).

The location and extent of this SEVDTR habitat for the Black-breasted Button-quail habitat within the K2E ASA is depicted in Figure 1.1. Appropriate impact mitigation and management measures for tampering with animal breeding places for the Black-breasted Button-quail are included in Table 5.2.

5.2.4 Spotted-tail Quoll

Approximately 17.7 ha of suitable Spotted-tail Quoll foraging and potential animal breeding places habitat will be impacted by the clearing of SEVTDR habitat for the K2E Project (refer Table 5.1). Foraging and potential breeding habitat within the SEVTDR habitat in the K2E ASA includes:

- complex habitat containing mature trees, rock piles, coarse woody debris and vine thicket for foraging
- logs and tree hollows for potential denning sites; and
- high abundance of prey items including invertebrates, reptiles, birds and small mammals.

Although Spotted-tail Quolls were not recorded during the field surveys, there are potentially viable areas present within the SEVTDR habitat suitable for foraging and breeding habitat.

The location and extent of this SEVTDR habitat for the Spotted-tail Quoll habitat within the K2E ASA is depicted in Figure 1.1. Appropriate impact mitigation and management measures for tampering with animal breeding places for the Spotted-tail Quoll are included in Table 5.2.

5.2.5 Short-Beaked Echidna

Approximately 17.7 ha of Short-beaked Echidna habitat suitable for potential breeding places for the species will be impacted by the clearing of SEVTDR habitat for the K2E Project (refer Table 5.1). The SEVTDR habitat within the K2E ASA supports all life cycle requirements for the species including:

- logs and coarse woody debris supporting foraging resources; and
- logs, coarse woody debris, rock piles and burrows suitable for potential breeding habitat.

Camera traps revealed that the Short-beaked Echidna is present throughout the SEVTDR habitat. The location and extent of this SEVTDR habitat for the Short-beaked Echidna within the K2E ASA is depicted in Figure 1.1. Appropriate impact mitigation and management measures for tampering with animal breeding places for the Short-beaked Echidna are included in Table 5.2.

5.2.6 Migratory birds (Rufous fantail, Black-faced Monarch and Spectacled Monarch)

Approximately 17.7 ha of migratory bird habitat suitable for potential breeding places for the species will be impacted by the clearing of SEVTDR habitat for the K2E Project (refer Table 5.1). The SEVTDR habitat within the K2E ASA supports requirements for the species including:

- dense vine thicket and rainforest suitable for foraging; and
- dense vine thicket and rainforest containing breeding places and resources for nesting.

Bird surveys revealed that the Rufous Fantail, Black-faced Monarch and Spectacled Monarch are present throughout the SEVTDR habitat. The location and extent of the SEVTDR habitat for these species within the extent of the K2E ASA is depicted in Figure 1.1. Appropriate impact mitigation and management measures for tampering with animal breeding places for these bird species are included in Table 5.2.

5.2.7 Yangochiropteran Bats

Approximately 17.7 ha of microbat habitat containing potential animal breeding places for the relevant microbat species will be impacted by the clearing of SEVTDR habitat for the K2E Project (refer Table 5.2). Potential breeding sites for microbats include:

- hollow bearing trees
- stags
- tree crevices; and
- loose bark.

Fifteen species of microbats were recorded during field surveys that are likely to utilise the above breeding sites within the K2E ASA.

The location and extent of SEVTDR habitat for microbats within the K2E ASA is depicted in Figure 1.1. Impact mitigation and management measures for tampering with animal breeding places for microbats are incorporated in to Table 5.2.

5.2.8 Retained habitats for relocation

SEVTDR habitat extends beyond the extent of the K2E ASA and this retained habitat outside the K2E ASA provides suitable alternative habitat for impacted threatened species. SEVTDR habitat is located outside the K2E ASA within Yarraman State Forest and vegetated areas within ML6674. This retained habitat provide areas of similar value to the SEVTDR habitat being impacted.

The adjacent and nearby retained habitats that are considered suitable for the relocation of the applicable species (healthy and uninjured) following capture, include:

- areas directly adjacent to the K2E ASA; and
- gullies and ridges north of Rocky Creek.

Suitable locations for the relocation of applicable species will be identified during the pre-clearing surveys.

If the option presents itself during initial clearing activities, large structurally sound hollows and hollow logs may be relocated to adjacent areas within retained habitats in order to provide additional microhabitats in these areas that provide refuge for displaced fauna, as well as for relocating displaced captured fauna.

5.2.9 Rehabilitation and maintenance of habitat

The Environmental Management Plan (EMP) prepared for the Project will provide appropriate general mitigation measures. Rehabilitation of habitat will include vegetation revegetation and landscaping to Stanwell specifications. This also includes dust and sediment control as well as weed control measures as outlined in the weed and pest management sub-plan of the EMP, to reduce the encroachment of environmental weeds within the Project Area.

Once mining activities have been completed in the K2E ASA and the areas become available, rehabilitation will be completed and monitored in accordance with Meandu Mine's Rehabilitation Management and Monitoring Program.

5.3 Project impact management strategies

The impact management strategies for the K2E Project have been developed using a hierarchy of controls. For the pre-clearing and clearing phases, these include:

1. Avoid and minimise – during the K2E Project planning and design phase, threatened species habitat and remnant vegetation clearing (including of SEVTDR) has been avoided and minimised to the greatest extent possible.
2. Mitigate and manage – during the clearing phase, habitat features will be avoided where possible (i.e. if they are on the edge of the clearing area and can be retained). Where possible, habitat features can be translocated into adjacent retained habitat (e.g. active bird nests can be translocated for some species, hollow logs can be translocated). Additional detailed fauna and habitat management measures are outlined in Table 5.2.

Furthermore, impact avoidance, minimisation, mitigation and management measures outlined in the following sections have been developed using Specific, Measurable, Achievable, Relevant and Time bound (SMART) criteria. Specifically, these include:

- Specific – management is specific to each species as outlined in Table 5.2.
- Measurable – impacts have been quantified in hectares and vegetation clearing and habitat disturbance will not exceed the quantified amount of hectares or the physically delineated K2E Project disturbance boundaries as shown in Figure 1.1.
- Achievable – the impact management strategies developed for this High-risk SMP are pragmatic and consider other logistical factors specific to the site including topography, vegetation density, adjacent habitat availability, and known behaviours of the fauna species. Health and safety aspects for involved personnel including Fauna Spotter-Catchers will also have to be considered. This High-risk SMP has been prepared by Senior and Principal Ecologists (Zoologists) with several years of experience in Fauna Spotter-Catcher work on a variety of mining and construction projects. The Ecologists have experience with the K2E Project having conducted numerous ecological surveys within the Project area and are familiar with the vegetation, habitat, fauna species, along with the development and implementation of High-risk SMPs. The mitigation measures within this High-risk SMP are therefore highly achievable.

- Relevant – this High-risk SMP is relevant to the type of habitat and fauna within the Project area and scale of Project-related impacts.
- Time bound – this plan specifies the relevant Project stage and has an ultimate timeline and schedule of works. Mitigation and management within Table 5.2 specifies whether it is specific to pre-clearing, clearing or post-clearing phase of the K2E Project.

5.3.1 Impact avoidance and minimisation

To avoid unnecessary impacts upon native fauna species and their habitat throughout the clearing of the SEVTDR for the K2E Project, the impact mitigation and management measures listed below have been developed for implementation during all proposed works.

This High-risk of impacts SMP has been developed for the applicable species outlined in Section 2.2.The High-risk SMP involves specific impact avoidance and mitigation measures involving:

- pre-clearing surveys
- vegetation clearing procedures
- Spotter-Catcher procedures; and
- reporting.

5.3.2 Impact mitigation and management

This section details the recommended impact mitigation and management measures to be applied during SEVTDR clearing activities to mitigate potential impacts to animal breeding places of the applicable species.

5.3.2.1 Suitably qualified and experienced person(s)

The following sections outline minimum requirements for the suitability qualified and experienced person(s) (SQEP) authorised under this High-risk SMP to monitor vegetation clearing activities, manage animal interactions during vegetation clearing and conduct pre-clearing surveys.

Qualifications and experience

A SQEP is a person with formal qualifications and/or experience in identification of native animals and wildlife ecology. A person is suitably qualified and experienced if they are:

- an ecological consultant with experience in conducting surveys for native animals breeding places; or
- a person who possesses a degree in natural science or similar with experience in conducting surveys for native animal breeding places; or
- a person who is authorised as a Spotter-Catcher under a Rehabilitation Permit (Spotter-Catcher) granted under the NC Act; and
- a person who has experience with the management of applicable species to this High-risk SMP, including but not limited to:
  - capture
  - handling
  - holding for any length of time
  - relocation
  - injury management; and
  - euthanasia.

Spotter-Catcher

A Spotter-Catcher is a person authorised under a current Rehabilitation Permit (Spotter-Catcher) in accordance with the NC Regulation to take and/or keep a protected animal whose habitat is about to be destroyed by human activity.

The Spotter-Catcher is responsible for assessing fauna for relocation and injuries (i.e. whether fauna needs to be taken to a veterinary hospital or wildlife hospital for treatment). This responsibility includes the humane destruction of fauna fatally injured during any part of construction (particularly vegetation clearing), which are too injured for treatment by a veterinarian or wildlife hospital, including young or eggs.

Spotter-Catchers must have the relevant licenses and be authorised to take and keep protected wildlife under a current Rehabilitation Permit (Spotter-Catcher) to obtain and keep of an animal whose habitat is about to be destroyed by human activity in accordance with the NC Regulation, section 202. The Spotter-Catcher must conduct all rescue and release methods in line with the *Code of Practice – Care of Sick, Injured or Orphaned Protected Animals in Queensland,* made under the NC Act, which includes releasing animals within a suitable distance from where they were captured and how long animals should be held for.

The Spotter-Catcher engaged in fauna monitoring must have prior, relevant, demonstrable experience in animal handling and breeding habitat identification and management of microbat roost/colonies during clearing. They must also be vaccinated against Australian Bat Lyssa Virus (ABLV) for microbat handling.

5.3.2.2 Management actions

The fauna management actions and corresponding management measures, performance criteria, roles and responsibilities, corrective actions and reporting obligations have been compiled in Table 5.2.

This table guides all relevant persons to the management actions required to be undertaken during the following phases of the K2E Project:

- pre-SEVTDR habitat clearing (i.e. pre-clearing surveys and document preparation)
- SEVTDR habitat clearing phase (i.e. vegetation clearing, removing or uprooting native vegetation, earthworks that include levelling, cut and fill, excavation and cutting down); and
- post- SEVTDR habitat clearing phase (i.e. remediation of infrastructure and/or addition of new infrastructure and weed management).

The actions, roles and responsivities for the implementation of the mitigation measures for each phase of SEVTDR habitat clearing are outlined in Table 5.2.

5.3.2.3 Limitations

The effectiveness of the impact management and mitigation measures for tampering with animal breeding places to be implemented via this High-risk SMP relies on the suitable qualifications and experience of the Spotter-Catcher engaged to implement the High-risk SMP. BUMA, as the coal mine operator, are responsible for engaging a Spotter-Catcher and adhering to the actions/controls outlined in this document. In the event of injuries or mortalities to the applicable species, the specific measures and procedures contemplated by this High-risk SMP and any necessary measures in accordance with a Rehabilitation Permit will be triggered and will need to be adhered to by the engaged Spotter-Catcher(s).

In the event of any non-compliance, this High-risk SMP includes procedures and reporting protocols by which relevant government agencies will be informed. This would assist in managing any non-compliances and inform any necessary corrective actions or adaptive management requirements.

5.4 Impact management plan actions

Table 5.2 Management actions, roles and responsibilities for each phase of SEVTDR habitat clearing

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Pre-SEVTDR Habitat Clearing Phase									
Pre-clearing surveys	The management measures for pre-clearance surveys include: — Clearing works are to be scheduled outside the breeding season for most applicable species (i.e. when females are giving birth, and juveniles are dependent) (refer to Table 4.1). The recommended time period for vegetation clearing is June to August. — Prior to the pre-clearing survey a surveyor will clearly mark the clearing limits with survey pegs and or flagging tape at 50 m intervals to clearly delineate no-go zones. — Pre-clearing surveys are to be undertaken by a Spotter-Catcher within fourteen (14) days prior to clearing commencing. In the event that fourteen (14) days have lapsed, pre-clearing surveys are to be repeated. — The pre-clearing surveys must: — identify and mark any potential animal breeding place for the applicable species with survey tape or paint — geo-locate using a GPS device all identified and marked potential animal breeding places — report on all identified and marked potential animal breeding places within the clearing area. — Identification of suitable release and relocation sites for rescued fauna is to be undertaken prior to clearing. The selection of release and relocation sites to be undertaken separately for each SEVTDR habitat clearing stage. These sites will be inspected prior to clearing works to assess environmental attributes and ensure that the extent of habitat resources present is at least equal to the conditions recorded in the K2E ASA. — The pre-clearing survey of the relevant habitats is to be completed by a SQEP or Spotter-Catcher (refer to Section 5.3.2) and a report prepared prior to the commencement of clearing works (allowing for report drafting and review).	☒	☒	☒	☒	☒	— Pre-clearing survey is undertaken in mapped habitat areas for each corresponding species as close as possible to clearing activities commencing, with a written report by the Spotter-Catcher of all identified and marked potential animal breeding places within the clearing area to be submitted to the Project Manager and Environmental Team Representative. — SEVTDR habitat clearing is appropriately scheduled (June to August (i.e. outside the breeding season of most applicable species). — Suitable relocation habitat type outside the K2E ASA for each applicable species has been identified. — Breeding sites for applicable species are geo-located and physically tagged and/or flagged for attention during the SEVTDR habitat clearing phase. — Any potential breeding places identified immediately adjacent to the potential impact area are flagged and delineated to exclude them from unnecessary disturbances. — Where Black-breasted Button-quail individuals are identified as being present within 50 m of the area of habitat scheduled for clearing, they must be allowed to disperse before works are to proceed.	If performance criteria are not met the following corrective actions apply: — if the pre-clearance report is not completed prior to SEVTDR habitat clearing commencing, no clearing is to be undertaken within mapped habitat areas provided within this report.	Project Manager Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Prestart meeting	Following the pre-clearing survey and before clearing commences, a prestart meeting will be held on-site with relevant personnel to discuss the objectives and outcomes of the pre-clearing survey, the planned sequences of clearing and any further requirements. The meeting will be led by the SQEP or Spotter-Catcher who is supervising the clearing with the following personnel in attendance: — Project Manager — Environment Team Representative — machine operators/persons responsible for clearing. Prior to the SEVTDR habitat clearing, all Spotter-Catcher(s) are to have read the High-risk SMP and understood the management and mitigation actions for the relevant task. The Spotter-Catcher or a SQEP will lead a short information session on: — identification of the species and species habitat relevant to this High-risk SMP — incident and emergency response procedures and contacts — roles and responsibilities of persons involved in the vegetation clearing and post-clearing stages; and — key requirements of this High-risk SMP. The Environment Team Representative is to clearly explain the expectations and procedures described within this High-risk SMP to the contractors. A summary for this purpose is detailed in Section 5.2.1.	☒	☒	☒	☒	☒	— Record of meeting attendance and meeting minutes. — Prior to SEVTDR habitat clearing all Spotter-Catcher(s) to have read and understood the High-risk SMP. — Prior to SEVTDR habitat clearing the Environment Team Representative is to have clearly explained the expectations and procedures described within this High-risk SMP to the contractors.	If performance criteria are not met the following corrective actions apply: — non-compliance issue/lesson learned are to be integrated into future daily toolbox talks with a view to ensure ongoing compliance — any non-compliance with pre-clearing meeting is to be reported immediately to the Project Manager and Environment Team Representative.	Project Manager Environment Team Representative Authorised Spotter-Catcher
Contact Authorised Wildlife Rehabilitators/Carers	In advance of clearing commencing, the Spotter-Catcher(s) will contact authorised wildlife rehabilitators/carers within the region to allow time to prepare for the potential for injured wildlife. This will include local South Burnett region wildlife rehabilitators/carers or South East Queensland wildlife rehabilitators/carers based on assessment of their suitability (by reference to the applicable species) and availability at the proposed time of clearing.	☒	☒	☒	☒	☒	— Spotter-Catchers have contacted relevant wildlife rehabilitators/carers prior to clearing commencing in the SEVTDR habitat.	If performance criteria are not met the following corrective actions apply: — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensure ongoing compliance — any non-compliance with wildlife rehabilitation contact is to be reported immediately to the Project Manager and Environment Team Representative.	Project Manager Environmental Team Representative Authorised Spotter-Catcher
Reporting	**Pre-clearing survey report** Following the completion of the pre-clearing survey, a pre-clearing survey report is to be completed. This report is to include: — map of areas surveyed — date and time of pre-clear survey — animal breeding places encountered and recorded locations, preferably with representative photos — location (description, lot/plan or latitude/longitude).	☒	☒	☒	☒	☒	— The pre-clearing survey report is completed and issued to the Project Manager and Environmental Team Representative.	–	Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
SEVTDR Habitat Clearing Phase									
Timing of works	Clearing works are to be undertaken outside the breeding season for most applicable species (i.e. when females are giving birth, and juveniles are dependent) (refer to Table 4.1). The recommended time period for vegetation clearing is June to August. This is to: — decrease the likelihood of impacting Black-breasted Button-quail adults abandoning eggs and or juveniles — decrease the likelihood of impacting microbat breeding behaviour and the likelihood of injuring vulnerable juvenile microbats — decrease the likelihood of impacting Short-beaked Echidna and Migratory birds breeding behaviour and decrease the likelihood of adults abandoning eggs and or juveniles during any clearing works. Clearing works within the SEVTDR are to be restricted to daylight hours. Night-works involving loud machinery are not permitted to allow any fauna to freely disperse and or mobile species such as flying foxes to forage with negligible risk.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Timing of works takes breeding behaviour of applicable species into consideration. — Clearing of the SEVTDR habitat is not undertaken at night.	The performance criteria are not met the following corrective actions apply: — in the event juvenile individuals are located, TEC Coal and the clearing contractor will allow time for the Spotter-Catcher to manage the situation, including the immediate transportation of animals to a carer/vet.	Project Manager Authorised Spotter-Catcher
Administrative	Prior to clearing, the Spotter-Catcher(s) must have read this High-Risk SMP. The following documentation must be kept accessible to all involved in the SEVTDR habitat clearing works during SEVTDR habitat clearing: — this High-risk SMP (particularly Section 5); and — a detailed map showing the clearing limits and clearing direction.	☒	☒	☒	☒	☒	–	–	Project Manager Authorised Spotter-Catcher
Vegetation clearing protocols	The following protocols apply to clearing: — Daily prestart meetings including clearing staff and the authorised Spotter-Catcher(s) are to be undertaken each day to confirm locations of potential animal breeding places, no-go zones and process for clearing. — For Black-breasted Button-quail and migratory bird habitat, a rapid survey will be undertaken in the immediate clearing area, immediately prior to (i.e. the morning of) each day of SEVTDR habitat clearing works to determine that no individuals are nesting within the relevant clearing area. — For microbat breeding habitat a rapid pre-clearing survey in conjunction with the above will be conducted immediately prior to commencement of clearing works, covering hollow bearing trees/stags, tree crevices, loose bark, rock overhangs and crevices. — For Spotted-tail Quoll and Short-beaked Echidna habitat, a pre-clearing survey in conjunction with the above will be conducted immediately prior to commencement of clearing works, covering logs, log piles, coarse woody debris, rock/boulder piles and or burrows. — Identified breeding places will be reinspected immediately prior to removal, modification, or disturbance. — The proposed impact area will be surveyed and clearly marked to prevent the disturbance or accidental clearing of adjoining native vegetation and habitats. — Vegetation clearing is to be undertaken in a sequential manner using a directional felling technique away from retained vegetation.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Demarcation of clearing areas and known animal breeding places are effectively applied as specified in the pre-SEVTDR habitat clearing phase. — Pre-start checks, such as integrity of no-go zones fencing, pre-clearance inspection of identified animal breeding places. — Mobile plant operators must not impact retained vegetation, and must be able to soft fell vegetation as determined by the Spotter-Catcher. — A Post-clearing Species Management Report is completed and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — non-compliance issue/lesson learned are to be integrated into future daily toolbox talks with a view to ensure ongoing compliance — any non-compliance with pre-clearing meeting is to be reported immediately to the Project Manager and Environment Team Representative	Project Manager Authorised Spotter-Catcher Machine Operator

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility

	— Vegetation clearing within the SEVTDR will be performed in a sequential manner, as described below:
	  — starting from the south-west corner, moving north (Stage 1)
	  — starting from the south-west corner moving east (Stage 2/3)
	  — this recommendation is to push all species within the K2E ASA into retained SEVTDR habitat and away from the active mine noting that the Black-breasted Button-quail adults will likely disperse due to the noise and vibration of land-clearing equipment.
	— Vegetation clearing is to be monitored by a suitably qualified and experienced person (refer to Section 5.3.1) holding a DETSI approved Rehabilitation Permit (Spotter-Catcher). Vegetation clearing will be undertaken in 2 stages:
	  1 removal of understorey vegetation and non-habitat trees to isolate habitat features, which are then left for 24 hours, allowing any wildlife to disperse
	  2 soft-felling of habitat features (as prescribed below).
	— One authorised Spotter-Catcher will monitor each machine in operation at all times.
	— Vegetation clearing within the SEVTDR habitat is to be undertaken using plant of an appropriate size and type for the vegetation being cleared including:
	  — excavators will use appropriate attachments while clearing habitat trees, such as a ripper, grabs, tree harvester attachments, or other suitable attachments
	  — only operators skilled and experienced in removing habitat trees with a tree harvester will operate an excavator with a tree harvesting attachment
	  — no mulching heads or mulching head (refer Section 5.2.2) attachments for clearing plant will be utilised for clearing of the SEVTDR habitat.								

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Tampering with habitat features	The management measures for removing hollow bearing trees, hollow logs, tree crevices, stags, burrows and another potential animal breeding places, include: — The tree felling must be soft-felled, i.e. performed in a manner that avoids unnecessary disturbances to retained vegetation and habitats as directed and dictated by the suitably experienced person or the authorised Spotter-Catcher. This is a requirement for the ethical treatment of wildlife and the safety of Spotter-Catchers. — Habitat features will be soft felled using an appropriately sized excavator. — Habitat features will be gently tapped, shaken or agitated before felling or removal to encourage any resident animals to either evacuate or at least become visible before felling or removal. — In the case of tree/stag habitat features utilise a method that allows the machine operator to soft fell the tree/stag without causing unnecessary disturbance and destruction. — Only upon direction from the suitably experienced person or the authorised Spotter-Catcher, will the operator soft fell the habitat tree/stag. — After soft-felling, all hollows and habitat features will be systematically checked for remaining fauna, as the excavator operator is on standby. Large hollows should be carefully inspected by the Spotter-Catcher with a torch and if required carefully dismantled in sections with an excavator under the instruction of the Spotter-Catcher. — Where practicable, large hollow bearing trees will be retained and relocated outside of the K2E ASA, to provide compensatory habitats for native fauna.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Any details relating to tampering with the potential animal breeding place are to be recorded each day and reported within the Post-clearing Species Management Report and submitted to TEC Coal. — The ability for the excavator operator to soft-fell trees/stags as. Ability will be assessed by the suitably experienced person or the authorised Spotter-Catcher. The inability to soft-fell will be treated as a non-compliance as it is a safety hazard	If performance criteria are not met the following corrective actions apply: — any non-compliance with tampering with animal breeding places is to be reported immediately to the Project Manager and Environment Team Representative within on working day to determine reporting requirements to DETSI — operators unable to soft-fell trees/stags will be trained at the contractor's expense until able to do so — non-compliance issues / lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher SEVTDR habitat clearing contractor
Tampering with breeding places - Black-breasted Button-quail	The management measures for removing potential animal breeding places related to Black-breasted Button-quail include: — if a nest with eggs is discovered the following will be selected from in priority of: **1** delaying and rescheduling the work to avoid peak breeding times of the Black-breasted Button-quail (refer to Table 4.1). **2** the nest is to be left in situ allowing the birds to complete the incubation and chick raising to fledging stage. An appropriate exclusion zone will be established around nests using the following method: the fauna spotter/catcher is to approach the nest from several directions and record the furthest distance that the incubating bird is disturbed from the nest, then add another 10m to the flushing distance.	☒	☐	☐	☐	☐	— Management measures are effectively applied. — Any details relating to tampering with the potential animal breeding place are to be recorded each day and reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance with tampering with animal breeding places is to be reported immediately to the Project Manager and Environment Team Representative within on working day to determine reporting requirements to DETSI — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
	When avoiding clearing of the area containing an active nest, or rescheduling the clearing until after fledging, it must be ensured that appropriate shelter and cover is left by leaving some surrounding vegetation to avoid predation and provide connectivity to retained adjacent habitat for dispersal (i.e. not leaving an active nest stranded within an otherwise cleared site with active construction). **3** if the above is not possible and all avenues have been exhausted, or if the nest has been abandoned, the eggs or young will be taken to a wildlife rehabilitator/carer. The surrounds will be inspected for remaining or injured birds. Any injured individuals, and dependent juveniles will follow the procedures below in *fauna injury* and *animal handling procedure*. — if a Black-breasted Button Quail nest has been disturbed unexpectedly causing the parents to abandon the nest, the following protocol will be implemented: **1** if the nest is intact but has been disturbed, the nest must be monitored for an hour. If the parents make no attempt to attend the nest, the eggs must be obtained by the Fauna Spotter-catcher **2** the eggs or juveniles will be taken to a wildlife carer for rehabilitation as per step 3 above.								
Tampering with breeding places – Migratory Birds	The management measures for removing potential animal breeding places related to Migratory Birds include: — if a nest with eggs is discovered the following will be selected from in priority of: **1** delaying and rescheduling the work to avoid peak breeding times of the Migratory Birds (refer to Table 4.1). **2** the nest is to be left in situ allowing the birds to complete the incubation and chick raising to fledging stage. A 20m exclusion zone will be established around nests. When avoiding clearing of the area containing an active nest, or rescheduling the clearing until after fledging, it must be ensured that appropriate shelter and cover is left by leaving some surrounding vegetation to avoid predation and provide connectivity to retained adjacent habitat for dispersal (i.e. not leaving an active nest stranded within an otherwise cleared site with active construction). **3** if the above is not possible and all avenues have been exhausted, or if the nest has been abandoned, the eggs or young will be taken to a wildlife rehabilitator/carer. The surrounds will be inspected for remaining or injured birds. Any injured individuals, and dependent juveniles will follow the procedures below in fauna injury and animal handling procedure.	☐	☐	☐	☐	☒	— Management measures are effectively applied. — Any details relating to tampering with the potential animal breeding place are to be recorded each day and reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance with tampering with animal breeding places is to be reported immediately to the Project Manager and Environment Team Representative within on working day to determine reporting requirements to DETSI — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
	— if the nest of a Migratory bird species has been disturbed unexpectedly causing the parents to abandon the nest, the following protocol will be implemented: **1** relocation of the nest containing the eggs and chicks will be attempted, unless the nest belongs to a Rufous Fantail as nest relocation for this species is likely to be unsuccessful. The nest containing eggs or chicks will be moved outside of the clearing footprint (if required put the migratory bird nest or inner nest lining into a small cardboard box with drainage holes). The relocation is successful once the parent reunites with the nest (call playback of chick noises may be used to attempt reuniting). **2** eggs or chicks should not be left unattended for long periods of time as they need to be regularly fed or kept warm. Therefore, carers will receive early notification where bird nests are disturbed in case care is needed. If the parents have made not attempts to attend the relocated or disturbed nest for an hour, the eggs/chicks will have to be taken to a carer. **3** if the relocation attempt is unsuccessful, the eggs or juveniles will be taken to a wildlife carer for rehabilitation. **4** the surrounds will be inspected for remaining or injured birds. Any injured individuals, and dependent juveniles will follow the procedures below in *fauna injury and animal handling procedure.*								
Tampering with breeding places-Spotted-tail Quoll and Short-beaked Echidna	The management measures for removing potential animal breeding places for the Spotted-tail Quoll and Short-beaked Echidna, include: — Burrows and potential dens will be carefully investigated using a borescope and torch or similar during pre-clearance surveys and immediately prior to disturbance. — Any burrow or den with noted individuals will be left in place overnight (24 hours) and re-inspected before removal. A 50 m buffer will be applied around the area and no works conducted in the buffer area until the animal/s have evacuated. — If the animal has not self-dispersed or the burrow is deemed by the SQEP as still active (by the presence of eggs or young), the exclusion zone must remain and no works are to occur until the breeding place is deemed by the SQEP as no longer active. — Dismantling a potential den will involve: — taking alternating turns, the authorised Spotter-Catcher and machine operator will carefully dismantle rock or logs in a sequential manner — allowing time for the authorised Spotter-Catcher to quickly inspect the potential den — allowing time for any resident animals to either show themselves or escape between each dismantling sequence until the potential den is completely dismantled. — The capture and handling of dependent juveniles, eggs, injured individuals and adults is outlined below in sections *fauna injury* and *animal handling procedure*.	☐	☒	☐	☒	☐	— Management measures are effectively applied. — Any details relating to tampering with the potential animal breeding place are to be recorded each day and reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance with tampering with animal breeding places is to be reported immediately to the Project Manager and Environment Team Representative within on working day to determine reporting requirements to DETSI — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Tampering with breeding places – microbats	It is typically not possible to distinguish daytime shelter sites from maternity roosts for hollow-dwelling Microbat species without accessing or capturing the animals. Therefore, to identify whether breeding places contain microbats, pre-clearance surveys (as outlined in the *Pre-clearance surveys* section above) must be undertaken prior to vegetation clearing commencing. The management measures for removing potential animal breeding places related to microbats, include: — the authorised Spotter-Catcher will be vaccinated for ABVL — only the vaccinated Spotter-Catcher will handle microbats — after soft-felling tree/stag (see above) or potential animal breeding places related to Microbats that are not confirmed to be in torpor, or maternity roosts: — the authorised Spotter-Catcher will conduct a visual inspection of any potential microbat roost within hollow bearing trees using a torch, including a comprehensive inspection of tree hollows and any cracks, crevices, holes, loose bark or other imperfection within the tree/stag — instances where the tree/stag is likely to be inhabited by microbats, but is not a maternity roost, the felled tree will be left in a safe place away from clearing, where possible, for 24 hours to allow the microbats to relocate overnight of their own accord — entrances to hollows/cracks/crevices will be plugged with calico bags, until the end of the workday, to ensure that microbats do not take flight during daylight hours, risking predation from raptors and corvids — The felled tree will have to be re-inspected the following day to ensure all Microbats have relocated on their own accord — If the above is not possible and all avenues have been exhausted, the Microbats will be captured and relocated. Follow procedure outlined below in section Animal handling procedure For Microbats confirmed to be in torpor or a maternity roost, the following hierarchy of control will be applied: — Avoiding clearing the tree by redirecting the access track or micro-sitting the infrastructure — Delaying and rescheduling the work to avoid peak breeding times of the Microbats — Delaying and rescheduling the clearing of the breeding place until all juveniles have become independent (only possible where the development of juveniles can be monitored). The following management protocol will be undertaken for microbats confirmed prior to clearing to be in torpor a maternity roost: For microbats confirmed in torpor: Microbats either not in a maternity roost or in a maternity roost must be left *in situ* during winter torpor as moving them during this time will most likely result in mortality. Works to be re-scheduled until end of torpor period and young are independent.	☐	☐	☒	☐	☐	— Management measures are effectively applied. — Any details relating to tampering with a potential animal breeding place are to be recorded each day and reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance within tampering with animal breeding places is to be reported immediately to the Project Manager and Environment Team Representative — non-compliance issues/lesson learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
	1 Individuals in confirmed maternity roosts must not be relocated, they must be left *in situ* even when found outside winter torpor period and works re-scheduled until the place is no longer being used as a breeding place and young are independent. 2 Microbats not in a maternity roost (or in torpor) may be relocated to alternative breeding place stuctures (i.e., nest boxes). 3 Microbats not in a maternity roost (or in torpor) may be excluded from inactive breeding places using appropriate exclusion devices, once the place has been vacated. 4 The loss of confirmed breeding places (either temporarily or permanently) must be compensated with installation of alternative breeding place structures (either temporary or permanent). This can be most easily achieved by relocating a section of hollow limb suitable in size for microbats. Prior to the works, the authorised Spotter-Catcher will conduct a full inspection of tree hollows to assess the potential residence of other fauna species (arboreal mammals, frogs or reptiles). Every effort will be made to remove and relocate animals safely.								
Animal handling procedures	The management measures for animal handling for each applicable species includes: — Black-breasted Button-quail and Migratory Birds: Due to the secretive nature of Black-breasted Button-quail and flight ability of Migratory Birds, it is unlikely that individuals will need to be captured. The following applies if either are injured, or active nests or eggs are located: — eggs and dependent juveniles will be placed in an appropriate box with extreme care. The box will contain a clean towel to ensure eggs do not roll and juveniles are kept warm and secure and transported to a wildlife rehabilitator as soon as possible — injured birds are to be captured, wrapped in a towel and placed in an appropriate box with woollen material to keep the animal secure and transferred to a vet or wildlife rehabilitator/carer. — Spotted-tail Quoll: Due to the large home ranges of the Spotted-tail Quoll, it is unlikely that individuals will need to be captured. The following applies in the case injured individuals or unexpectedly abandoned young — All Spotted-tail Quolls will be handled with appropriate gloves and other required PPE at the discretion of the Spotter-Catcher. — If dens or juveniles are abandoned before or after den excavation, juveniles will be captured for possible captive rearing and subsequent release into relocation sites. — Captured dependent juveniles and injured adults will be secured in an appropriate and secure container, stored with an appropriate material (woollen cloth) for warmth and placed in an and transferred to a vet or wildlife rehabilitator/carer.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Any details relating to animal handling are to be reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance within tampering with animal breeding places will be reported immediately to the Project Manager and Environment Team Representative — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
	— Captured adult Spotted-tail Quolls will be secured in an appropriate and secure container and immediately relocated to designated relocation sites. — Release of adult Spotted-tail Quolls will be as hands off as possible, allowing the individual to safely leave the opened box into suitable habitats including hollow logs or rock piles. — Short-beaked Echidna: Due to the management procedures outlined above, it is unlikely that individuals will need to be captured. The following applies in the case injured individuals or unexpectedly abandoned eggs or young: — If juveniles are unexpectedly abandoned, juveniles will be captured for possible captive rearing and subsequent release into relocation sites. — Short-beaked Echidna should be handled only by the suitably qualified person (Spotter-Catcher) using proper handling procedures, using appropriate gloves. — Captured adult Short-beaked Echidna will be secured in an appropriate box and immediately relocated to designated relocation sites. — Captured dependent juveniles and injured adults will be secured in an appropriate bag, stored with an appropriate material (woollen cloth) for warmth and placed in an appropriate non-sealed container and transferred to a vet or wildlife rehabilitator/carer. — On the discovery of unexpectedly abandoned Short-beaked Echidna eggs: — They will carefully be excavated by hand taking extreme care to prevent eggs being cracked, punctured, or rotated. — Eggs will be carefully removed from the nest and placed into a transport container, containing clean appropriate material (woollen cloth) for warmth, ensuring that the eggs are unable to roll, and placed in an appropriate non-sealed container (to allow oxygen flow) and transferred to an appropriate vet or wildlife rehabilitator/carer. — Microbats: — Any hollow with noted individuals will be left in place over night and re-inspected before removal a 50 m buffer will be applied around the hollow tree with no works conducted in the buffer area to allow 24 hours for the animal/s to evacuate. — If after 24 hours, the animal/s have not evacuated the procedures outlines above will apply. — If juvenile microbats are abandoned before or after tampering all animals will be relocated to bat-box within the K2E ASA as close as possible, allowing for female microbats to take their juveniles at their own accord. The bat-box will be attached to a tree and will not be cleared until the following day. Female microbats will find and remove their juveniles at night via call recognition.								

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
	— The bat-box will be reinspected the morning of the following day and any remaining bats will be taken to a suitable carer immediately due to the likelihood of injury. — The wildlife rehabilitator/carer will be notified the night before to arrange juvenile collection, if needed. — General: — If juvenile animals (excluding microbats) are abandoned before or after tampering, juveniles will be captured for possible captive rehabilitation and subsequent release into relocation sites. — If animals do not move or they cannot be captured because the tree hollow or log is too large, high or its recovery would breach OH&S requirements then the tree will be soft-felled in accordance with the procedures outlined above for felling trees or removing hollow logs, with any resident animals recovered post-felling. — Animals kept for any purpose will be secured in a calico bag, stored with an appropriate material for warmth, placed in an appropriate non-sealed container and placed in a cool and stable location until its release or for transport to an approved carer or relocation. — Should any microbats be injured or suspected to be injured they will be immediately removed and taken to an appropriately qualified veterinarian or wildlife rehabilitator/carer for rehabilitation. Refer to *fauna injury procedure.* — Microbats can enter torpor at any time of the year but are more likely to enter extended periods of torpor during the colder months (Geiser et al. 2019). Adaptive management for Microbats that have been unintentionally disturbed while undergoing torpor must be warmed up gently during the day to allow them to disperse on their own at night. If the bats are still unable to fly by nightfall, they will have to be taken to a suitable bat carer.								

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Fauna injury procedure	Any injured animals are to be inspected and health assessed by the suitably qualified person or authorised Spotter-Catcher. If the injuries are minor (such as cuts or abrasions, excluding microbats), minor first aid should be given and the animal/s monitored prior to release. First aid should not be given outside the scope of the persons capabilities. Injured animals requiring additional care are to be securely placed in a suitable container and taken to a local wildlife rehabilitator/carer or suitable veterinarian for assessment and treatment. In some instances, severely injured animals may need to be euthanised on site to prevent prolonged suffering. Euthanasia of native species will only be untaken under the following circumstances: — the assistance of a veterinarian is not available within an appropriate timeframe given the suffering of the animal — the time taken to transport the animal to a veterinarian would impose undue further suffering for the animal — the requirements of the *Code of Practice – Care of sick, Injured or Orphaned Protected Animals in Queensland* will be met in respect of the method of euthanasia and methods will conform with the appropriate animal ethics license — the requirements of the DAF *Animal Care and Protection Act 2001* will be met — the chosen method of euthanasia will cause instant or rapid insensibility (loss of consciousness), following shortly afterwards (and before return of consciousness) death — the person proposed to conduct the euthanasia procedure is competent at the procedure — the carcass is not disposed of until death is confirmed.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Any details relating to fauna injury are to be reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance within tampering with animal breeding places is to be reported immediately to the Environment Team Representative — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher
Mortality procedures	If a suspected mortality has occurred, vegetation clearing works are to stop until the Spotter-Catcher has dealt with the situation or another Spotter-Catcher is on hand to continue works, and the following measures applied: — the area is to be checked for juveniles, including the animal itself in the case of females — death needs to be confirmed prior to disposal of carcass.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Any details relating to fauna injury/mortality are to be reported within the Post-clearing Species Management Report and submitted to TEC Coal.	If performance criteria are not met the following corrective actions apply: — any non-compliance within tampering with animal breeding places is to be reported immediately to the Project Manager and Environment Team Representative — non-compliance issues/lesson learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher Machine Operator/s

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Preventing vegetation clearing outside of K2E ASA during SEVTDR habitat clearing within the K2E ASA	The following protocols apply to prevent clearing occurring outside the K2E ASA while SEVTDR habitat clearing is occurring within the K2E ASA: — the K2E ASA boundary will be surveyed and clearly marked to prevent the disturbance or accidental clearing of adjoining retained native vegetation and habitats — vegetation clearing within the K2E ASA is to be undertaken in a sequential manner using directional felling, away from retained vegetation — one authorised Spotter-Catcher will monitor each operational machine at all times.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Demarcation of clearing areas and known breeding places is effectively applied as specified in the pre-SEVTDR habitat clearing phase. — Pre-start checks, such as integrity of no-go zones fencing, pre-clearance and inspection of identified animal breeding places.	If performance criteria are not met the following corrective actions apply: — non-compliance issues/lesson learned are to be integrated into future daily toolboxes talks with a view to ensuring ongoing compliance.	Project Manager Environmental Team Representative Authorised Spotter-Catcher Machine Operator
Post SEVTDR Habitat Clearing Phase									
Reporting	**Post-clearing Species Management Report** Following the completion of clearing, a Post-clearing Species Management Report is to be completed. This report is to list outcomes of clearing, including: — maps of areas cleared — date and time of clearing works — details of the authorised Spotter-Catcher or Ecologist who conducted the work and the relevant Rehabilitation Permit (Spotter-Catcher) details — animal breeding places encountered (as identified in the Animal Breeding Places Register) — animal handling, species and actions (e.g. species released, released with first aid, death, investigation) — capture and release location (description, lot/plan or latitude/longitude) — animals that are sighted, captured, released, injured, transferred to a wildlife carer/rehabilitator or vet, killed or humanely euthanised — fauna rescue records of the fauna relocation sites including date, time, location (GPS) — High-risk SMP Animal Breeding Places Register — any non-compliance with the management measures or failure to meet the performance criteria and any corrective actions taken — any recommendations.	☒	☒	☒	☒	☒	— Management measures are effectively applied. — Any details relating an injuries and mortalities are appropriately reported. — Any details relating to tampering with animal breeding place are to be recorded each day and reported within the post-clearing Species Management Report and submitted to TEC Coal. — High-risk SMP Animal Breeding Places Register provided to DETSI within the specified timeframe (within 6 months of interaction with high-risk species).	If the performance criteria are not met, the following corrective actions apply: — any non-compliance with reporting is to be reported immediately with the TEC Environment Team Representative — non-compliance issues/lesson learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Environmental Team Representative Authorised Spotter-Catcher

Management action (activity)	Management measures and controls	Black-breasted Button Quail	Spotted-tail Quoll	Micro bats	Short-beaked Echidna	Migratory birds	Performance criteria and trigger values	Corrective actions	Responsibility
Contingency									
Adaptive Management	Due to the seriousness of animal injury and mortality, incidents require an adaptive management approach to minimise the risk of future incidents. This may include immediate adaptive management measures such as changing the type of clearing machine or attachments, clearing direction, presence of additional Fauna spotter-catchers, or delaying clearing of specific habitat areas or features (e.g., where feasible, active bird nest clearing delayed until chicks have fledged, etc.). The following situation relating to conservation significant species in this High-risk SMP requires adaptive management: — if the relocation areas directly adjacent to the Project Area are discovered to be, or become unsuitable (e.g. vegetation community not as mapped, microhabitat features such as leaf litter or ground cover absent), the following will occur: — no removal of conservation significant species habitat may occur until a suitable relocation area is found by the Fauna spotter-catcher. The location of the new relocation area will be relayed to the TEC Coal Environmental Representative.	☒	☒	☒	☒	☒	— Revision of the effectiveness of mitigation measures and procedures within this High-risk SMP. — Revision of potentially ineffective performance targets.	If the performance criteria are not met the following corrective actions apply: — any non-compliance with adaptive management is to be reported immediately to the TEC Coal Environment Team Representative — non-compliance issues/lesson learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environment Team Representative Authorised Spotter-Catcher
Amendment of the High-risk SMP	Where the following situations occur, Stanwell must incorporate updates to this document and apply for an amendment to this High-risk SMP through DETSI as required: — major changes to the methodology because of adaptive management. — changes to the Project Area where clearing is required outside of the originally approved area — new species have been identified within the Project Area, where tampering with breeding places will require a High-risk SMP. — a greater number of species tampered with or impacted by the activity than originally assessed — a new nominated person in charge	☒	☒	☒	☒	☒	— this High-risk SMP is updated and an amendment application lodged with DETSI when the listed situations occur.	If the performance criteria are not met the following corrective actions may need to be applied: — any non-compliance with adaptive management is to be reported immediately to the TEC Coal Environmental Officer — non-compliance issues/lessons learned are to be integrated into future daily toolbox talks with a view to ensuring ongoing compliance.	Project Manager Environment Team Representative Authorised Spotter-Catcher

5.5 Compliance reporting

As outlined in Section 6 of the SMP Information Sheet (DES, 2020), TEC Coal must keep an electronic register concerning tampering with animal breeding places (The Animal Breeding Places Register) while operating under an approved High-risk SMP. This must be submitted to DETSI within 6 months of the interaction with the high risk of impacts SMP applicable species, and the complete electronic register must be submitted to DETSI within 10 business days of the approved High-risk SMP expiring.

Compliance reporting will be prepared and submitted to TEC Coal after completing each stage of SEVTDR habitat clearing as follows:

- Pre-clearing Survey Report
- Post-clearing Species Management Report.

A Post-clearing Species Management Report is to be provided to the TEC Coal for the post-SEVTDR habitat clearing phase, as detailed in Table 5.2. The Post-clearing Species Management Report must include the following:

- introduction and purpose
- date the works were undertaken
- number of breeding places destroyed (as included in the breeding places register)
- species management measures
- number of individuals captured and compliance with mitigation measures
- details of fauna dispersals, captures, relocations, injuries and or deaths
- details of the authorised Spotter-Catcher or SQEP / Ecologist who conducted the work and rehabilitation permit details
- non-compliances with High-risk SMP management measures, performance criteria and corrective actions, and
- recommendations.

With the implementation of the Impact Management Plan outlined in this High-risk SMP, it is expected that there will be no mortality to the applicable species, eggs, or young. Under the conditions of the Fauna Spotter-Catcher Rehabilitation Permit, any threatened fauna mortality recorded will be reported to DETSI within 24 hours of the incident occurring.

Bibliography

- 3D Environmental, June (2008): Meandu Mine Surface Area Extension, Review of Terrestrial Flora Studies.
- Belcher CA (2003). Demographics of tiger quoll (Dasyurus maculatus maculatus) populations in south-eastern Australia. Australian Journal of Zoology 51, 611-626.
- Biodiversity Assessment and Management Pty Ltd, December (2009). Potential Exploration Sites ML6674 Meandu Mine – Conservation Significant Fauna Assessment.
- Birdlife (2021a), Rufous Fantail. Retrieved from https://birdlife.org.au/bird-profile/rufous-fantail.
- Birdlife (2021b), Black-faced Monarch. Retrieved from https://www.birdlife.org.au/bird-profile/black-faced-monarch.
- Birdlife (2021c), Spectacled. Retrieved from https://birdlife.org.au/bird-profile/spectacled-monarch.
- Bush Heritage (2021), Short-beaked Echidna. Retrieved from https://www.bushheritage.org.au/species/echidna.
- Churchill, Sue (2008). *Bats of Australia, second edition.* New Holland Publishers, Crows Nest, Australia.
- Coffey Natural Systems Pty Ltd, July (2008): Meandu Mine Black-Breasted Button-Quail Assessment.
- Commonwealth of Australia (2014) Environmental Management Plan Guidelines, Department of the Environment.
- Cronin L (1991). Key Guide to Australian Mammals. Balgowlah, NSW: Reed Books.
- Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2023). Species Profile and Threats (SPRAT) Database, accessed at: https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.
- Department of Environment and Science (DES) (2019). Microbats: The insect terminators. Retrieved from: https://environment.des.qld.gov.au/wildlife/animals/living-with/bats/micro-bats.
- Department of Environment and Science (DES) (2020). Information Sheet, Species Management Program Requirements for tampering with a protected animal breeding place in Queensland, Version 1.00, Effective 22 August 2022.
- Department of Environment Water Heritage and the Arts (DEWHA) (2010). Survey guidelines for Australia's threatened bats - Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Canberra, Department of the Environment Water Heritage and the Arts.
- Department of Environment Water Heritage and the Arts (DEWHA) (2010b). Survey guidelines for Australia's threatened birds - Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Canberra, Department of the Environment Water Heritage and the Arts.
- Department of Environment Water Heritage and the Arts (DEWHA) (2010c). Survey guidelines for Australia's threatened frogs - Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Canberra, Department of the Environment Water Heritage and the Arts.
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2011). Survey Guidelines for Australia's threatened mammals. Canberra, Department of Sustainability, Environment, Water, Population and Communities.
- Ecotone Environmental Services Pty Ltd, (2008): Meandu Coal Mine Extension – Supplementary Report on Flora & Fauna Assessment, and EPBC Assessments for Threatened Biota, Final Report.
- Ecotone Environmental Services Pty Ltd, (2005): Meandu Coal Mine Extension – Flora and Fauna Assessment.

- Edgar R and C Belcher (2008). Spotted-tailed Quoll, Dasyurus maculatus (Kerr, 1792). In: Strahan, R., ed. The Mammals of Australia. Page(s) 61-62. Carlton, Victoria: Reed New Holland.
- Eyre, T.J,; Ferguson, D.J., Hourigan, C.L.; Smith. G.C.; Mathieson, M.T.; Kelly, A.L; Venz, M.F.; Hogan, L.D.; and Rowland, J., (2018). Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland, Department of Environment and Science, Queensland Government, Brisbane.
- Garnett ST, Szabo JK and Dutson G (2011). The Action Plan for Australian Birds 2010. CSIRO Publishing, Collingwood, Victoria.
- Goldingay Ross L. (2009) Characteristics of tree hollows used by Australian birds and bats. Wildlife Research 36, 394-409.
- Green RH and Scarborough TJ (1990). The spotted-tailed quoll Dasyurus maculatus (Dasyuridae, Marsupialia) in Tasmania. The Tasmanian Naturalist 100, 1-14.
- Hamley T, Flower P and Smith GC (1997). Present and past distribution of the Black-breasted Button-quail *Turnix melanogaster* (Gould) in Queensland. Sunbird 27, 1–21.
- Jones M. (1997). Character displacement in Australian dasyurid carnivores: size relationships and prey size patterns. Ecology 78, 2569-2587.
- Körtner G, Gresser S, Mott B, Tamayo B, Pisanu P, Bayne P and Harden R (2004). Population structure, turnover and movement of spotted-tailed quolls on the New England Tablelands. Wildlife Research 31, 475-484.
- Körtner G, Holznagel N, Felming PJS and Ballard G (2015). Home range and activity patterns measured with GPS collars in spotted-tailed quolls. Australian Journal of Zoology. 63, 424-431.
- Lees N and Smith GC (2000). Use of mature hoop pine plantation by the vulnerable Black-breasted Button-quail (*Turnix melanogaster*). Australian Forestry 62, 330–335.
- Marchant S and Higgins PJ (Eds) (1993). Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings. Oxford University Press, Melbourne.
- Mathieson MT and Smith GC (2009). National recovery plan for the black-breasted button-quail Turnix melanogaster. Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Department of Environment and Resource Management, Brisbane.
- Nowak B, Crane M and Jones B (2005). Aquatic Animal Health Subprogram: Development of national investigation and reporting protocols for fish kills in recreational and capture fisheries. FRDC2005/620 Fisheries Research and Development Corporation, Canberra.
- Pizzey G and Knight F (1997). Field Guide to the Birds of Australia. Angus and Robertson, Australia.
- Rismiller, Peggy & McKelvey, Michael. (2000). Frequency of Breeding and Recruitment in the Short-Beaked Echidna, *Tachyglossus aculeatus*. Journal of Mammalogy - J MAMMAL. 81. 1-17. 10.1644/1545-1542(2000)081<0001:FOBARI>2.0.CO;2.
- RPS Australia East Pty Ltd (RPS), November 2012: King 2 & King 4 Ecological Studies: Meandu East Expansion Project (RPS, 2012a).
- RPS Australia East Pty Ltd (RPS), 2012: Meandu East Project Pre-feasibility Assessment Mitigation Strategies Report (RPS, 2012b).
- Scheelings, T. (2016), Morbidity and mortality of monotremes admitted to the Australian Wildlife Health Centre, Healesville Sanctuary, Australia, 2000–2014. Aust Vet J, 94: 121-124.
- Smith GC, Aridis J and Lees N (1998). Radio-tracking revealed home ranges of Black-breasted Button-quail *Turnix melanogaster* in remnant vine scrub between hoop pine plantation and agriculture. Emu 98, 171–177.

- Smyth AK and Young J (1996). Observations on the endangered Black-breasted Button-quail *Turnix melanogaster* breeding in the wild. Emu 96, 202–207.
- Sprent Jenny, Nicol Stewart C. (2012) Influence of habitat on home-range size in the short-beaked echidna. Australian Journal of Zoology 60, 46-53.
- Sprent Jenny A., Nicol Stewart C. (2016) Diet of the short-beaked echidna (Tachyglossus aculeatus) in the Tasmanian Southern Midlands. Australian Mammalogy 38, 188-194.
- Woinarski JCZ, Burbidge AA & Harrison PL (2014). Spotted-tailed Quoll (south-eastern mainland) in The action plan for Australian Mammals 2012, CSIRO publishing, Collingwood, 84-87.

Appendix A

Suitably qualified and experienced person's CVs

CARLA MEERS

Associate Ecologist

6 years with WSP

9 years of experience

Areas of expertise

Terrestrial ecology

Project management

Ecological assessment and significant impact assessment

Fauna and land clearing management

Fauna and habitat survey and assessment

Aquatic fauna management and relocation

Koala survey and trapping

PROFILE

Carla has over 9 years' experience in aquatic and terrestrial fauna management and consulting throughout Queensland and New South Wales. She is experienced in project management, ecological assessment and targeted fauna surveys, terrestrial and aquatic fauna management and advise during land clearing, and detailed fauna and habitat assessment and reporting.

Carla has highlighted experience managing projects involving fauna management and ecological surveys in the transport and aviation, coal mining and quarrying, and residential civil construction sectors. Her industry expertise extends to implementing practical and efficient on ground fauna management prior to and during construction, as well as preparation of management plans for fauna and habitat.

EDUCATION

University of Queensland
Bachelor of Marine Studies majoring in Marine Biology and Ecology 2010
First Class Honours in Marine Population Genetics.

PROFESSIONAL EXPERIENCE – FAUNA MANAGEMENT AND SPOTTER CATCHER

Mining

- **Vegetation Clearing E Pit and F Pit Expansion, and Curragh Main Pit Expansions, Blackwater Qld, Australia (2020-2022): Coronado Curragh Mine, Fauna Spotter/Catcher.**

  Field and technical lead during vegetation clearing for mining pit expansions over three separate clearing events. Responsibilities included pre-clearing survey, fauna management including capture and relocation of fauna during clearing works, and preparation of a post-clearing fauna management report.

- **Vegetation clearing for East, West, South, and Central Pit expansions, Blair Athol Qld, Australia (2019-2021): TerraCom Blair Athol Coal Mine, Ecologist/Fauna Spotter Catcher.**

  Field and technical lead during vegetation clearing for ongoing mining pit expansion. Responsibilities include pre-clearing surveys, fauna management including capture and relocation of fauna during clearing works, adherence to legislative requirements surrounding Koalas, and preparation of post-clearing fauna management reports and breeding habitat registers.

- **Blackwater Creek Diversion Fauna Load Reduction Trapping and Vegetation Clearing, Blackwater Qld, Australia (2020): Coronado Curragh Mine, Project Manager/Ecologist.**

  Project manager and ecologist for vegetation clearing in the fauna management area of the Blackwater Creek diversion. Responsibilities included pre-clearing survey, load reduction trapping and active searches, fauna management including capture and relocation of fauna during clearing works, and preparation of a detailed fauna management report.

- **Vegetation Clearing – Train Load Out Facility Expansion, Blair Athol Qld, Australia (2020): TerraCom Blair Athol Coal Mine, Fauna Spotter/Catcher**

  Responsible for field assessment of ecological values, including field ecological fauna survey and pre-clearance survey, and preparation of an ecological values report. Preparation of species management plans for the Train Loadout facility expansion. Supervision of vegetation clearing for the Train Loadout facility expansion and mine pit expansions.

- **Vegetation Clearing – mine pit expansion, Boggabri NSW, Australia (2020): Idemitsu Boggabri Coal, Fauna Spotter/Catcher**

  Supervision of vegetation clearing for mining pit expansion. Responsibilities included pre-clearing fauna load reduction walk, fauna management including capture and relocation of fauna during clearing works.

- **Pre-clearance Survey, Boggabri NSW, Australia (2020): Idemitsu Boggabri Coal, Ecologist**

  Fauna and habitat pre-clearance survey including identification of habitat trees, habitat quality assessments and release site assessments.

- **Blair Athol Surface Expansion, Blair Athol, Qld, Australia (2019): TerraCom Blair Athol Coal Mine, Project Manager and Lead Koala/Fauna Spotter.**

  Responsible for organization of subcontractors, pre and post clearing surveys, post-clearing fauna management report preparation and submission, client liaison, and adherence to legislative requirements surrounding Koalas. Field tasks included detailed pre-clearing fauna and habitat surveys and GIS mapping, subcontractor management, and fauna management during vegetation clearing.

- **Jeebropilly Mine Expansion, Jeebroopilly, Qld, Australia (2017-2018): New Hope Group, Project Manager and Lead Koala/Fauna Spotter.**

  Project Manager and Lead Koala/Fauna Spotter during ongoing clearing works. Responsible for organization of pre and post clearing surveys, report preparation and submission, client liaison, and adherence to legislative requirements surrounding Koalas. Field tasks included detailed pre-clearing fauna and habitat surveys and GIS, targeted dawn thermal imagery and visual Koala surveys, and Koala management during clearing works.

- **Moy Pocket Quarry, Moy Pocket, Qld, Australia (2017): Boral, Koala/Fauna Spotter.**

  Responsible for Koala management during land clearing as well as Fauna Spotter/Catcher works.

- **Ormeau Quarry, Ormeau, Qld, Australia: (2017): Boral, Fauna Ecologist.**

  Responsible for review of the Dewatering Management Plan, conducting targeted threatened amphibian surveys for Tusked Frog (*Adelotus brevis*), as well as aquatic load reduction trapping prior to dewatering. Aquatic Fauna Spotter for fish salvage and relocating during dewatering, and terrestrial Koala/Fauna Spotter during land clearing.

- **Narangba Quarry, Narangba, Qld, Australia (2015): Boral, Field Ecologist.**

  Responsible for arboreal mammal and bird nest box installation in accordance with clearing offset requirements, and direction to climbing arborists for Powerful Owl (*Ninox strenua*) nest box installation.

Energy and Utilities

- **Vegetation Clearing Management for Several Sites throughout the Western Downs (Arrow Southern QLD Sites), Australia (2017-2018): AECOM, Project Manager.**

  Project Manager for mobilisation of Fauna Spotters to sites undergoing vegetation clearing and topsoil stripping, including Grey Snake (*Hemiaspis damelii*) management across various Arrow gas field sites in SEQ.

Transport

- **New Parallel Runway, Brisbane International Airport, Qld, Australia (2017-2019): Skyway (CPB Constructions & BMD Constructions JV), Project Manager/ Ecologist.**

Responsible for ongoing project management over 2 years, including staff procurement, scheduling and inductions, organisation of terrestrial and aquatic fauna spotters, fauna and environmental management and advice, delivery of basic monthly reporting and detailed pre and post clearing reporting, invoicing, data management, and adherence to legislative and BAC specific requirements. More specifically: pre-clearing terrestrial, brackish, and marine fauna and habitat surveys and reporting; conducting detailed weed surveys and reporting, and weed management; EVNT surveys using thermal imagery and call playback for Lewin's rail (*Lewinia pectoralis);* preparation of a Construction Procedure for Injured Animals, and Construction Procedure for Sensitive Habitat; fauna spotter and wildlife callouts including venomous snakes; load reduction trapping, fish salvage and relocation during dewatering of tidal waterways. Field work included both airside and landside areas.

- **Mudgeeraba to Varsity Lakes Pacific Highway Upgrade, Mudgeeraba, Qld, Australia (2018 - 2019): Seymour Whyte, Ecologist.**

  Responsible for project and fauna management including pre-clearing fauna and habitat surveys, pre-clearing reporting and GIS; colonial breeders management including Microchiropteran bats and Welcome Swallows (*Hirundo neoxena*) present in culverts and bridges, and installation of fauna exclusion devices (Micro bats) and reporting in accordance with DTMR State-wide SMP's; wildlife callouts and removals/management including venomous snakes and flying foxes; organising and conducting wildlife demonstrations and presentations at toolbox talks (venomous snakes, colonial breeders).

- **Cross River Rail Project Land Centre and GoPrint Centre Demolition, Woolloongabba, Qld, Australia (2017 – 2019): Department of Housing and Public Works, Project Manager/Fauna Ecologist.**

  Responsibilities included conducting pre-clearing fauna and habitat surveys, reporting and GIS. Overseeing fauna management during vegetation clearing and building demolition, and overseeing the relocation and management of politically sensitive family of Bush Stone-curlews *(Burhinus grallarius).*

- **Caloundra Road to Sunshine Motorway Bruce Highway Upgrade, Caloundra, Qld, Australia (2016 - 2017) –Seymour White/Fulton Hogan JV, Lead Fauna Spotter Catcher.**

  Responsible for conducting detailed pre-clearing surveys, supervising Ecologist during vegetation management (weed spraying), Lead Fauna Spotter and client liaison during vegetation clearing.

- **Gold Coast Airport Upgrade Tidal Canal Dewatering, Gold Coast, Qld, Australia (2017): SEE Civil, Lead Aquatic Fauna Spotter Catcher.**

  Responsibilities included client liaison, expertise and consultation on logistics for a 200 meter long estuarine tidal canal dewatering at Gold Coast Airport, Coolangatta. Tasks included load reduction trapping, fish salvage and relocation, staged dewatering management (multiple days), and report preparation and delivery.

- **Boundary Road Interchange Upgrade, Bruce Highway Narangba, Qld, Australia (2016): BMD Constructions, Fauna Ecologist.**

  Tasks included targeted nocturnal and diurnal surveys and relocation of threatened amphibians including Wallum Froglet and Wallum Rocket Frog. Fauna Spotter during vegetation clearing.

Wildlife Parks

- **Koala Procurement, Gold Coast, Qld (2018-2019). Dreamworld, Ecologist**

  Collaboration with the Captive Breeding Program, including targeted koala surveys and specialised trapping and capture. Working with collaborative researchers such as John Callaghan as well as independently.

Government

- **Royal Australian Air Force Bases Fauna Management, Amberley, Canungra, and Enoggera Qld, Australia (2016 – 2019): Laing O'Rourke and BMD Constructions, Project Manager /Fauna Spotter Catcher.**

  Tasks included Fauna Spotter during vegetation clearing and building demolition across several Department of Defense bases, as well as EWP subcontractor management and installation of 109 nest boxes at RAAF Amberley. Weed monitoring surveys.

- **Wide Bay Training Facility Fire Trail Upgrades, Toolara, Qld, Australia (2016): Terrequip / Australian Department of Defence, Fauna Spotter Catcher.**

  Tasks included Fauna Spotter during vegetation clearing, and surveys for threatened plant Pineapple Zamia (*Macrozamia pauli-guilielmi*).

Residential and Community

- **Pelican Waters Residential Estate Macropod Translocation, Caloundra, Qld, Australia (2019): Pelican Waters Hart, Ecologist.**

  Primary author on the preparation of a Translocation Management Plan for the translocation of a large population of Eastern Grey Kangaroos (EGKs) (*Macropus giganteus*). Field Technician during the translocation of EGKs, and weekly post-translocation monitoring of EGKs.

- **Enoggera Creek Flying Fox Dispersal, Herston, Queensland, Australia (2019): Abergeldie Constructions, Ecologist.**

  Preparation of a Flying Fox Relocation Management Plan for a camp of 10,000 Little Red and Grey Headed Flying Foxes requiring dispersal to facilitate bridge replacement works. Population survey and Field Technician during the dispersal of Flying Foxes.

- **Sanctuary Cove Macropod Management and Translocation, Santury Cove, Qld, Australia (2016 & 2018): Sanctuary Cove, Ecologist.**

  Field Ecologist for bi-annual population surveys of EGKs over The Palms and The Pines Golf Courses, and processing of data for population management including translocation, lethal control and the fertility management program. Field Technician for translocation and, where required, lethal control and processing of EGKs.

- **Capestone Lake and Residential Development, Mango Hill, Qld, Australia (2016 - 2019): BMD Constructions, Project Manager and Koala/Fauna Spotter and Aquatic Fauna Spotter.**

  Tasks included koala/fauna spotter during clearing works, including Koala management and capture of a Koala for Dreamworld's Captive Breeding Program. Detailed pre-clearance surveys, GIS and reporting, Aquatic Fauna Spotter for fish salvage and relocation during ongoing freshwater and brackish dewaterings.

- **Flagstone Residential and School Development, Jimboomba, Qld, Australia (2018-2019): SEE Civil and PEET, Project Manager /Ecologist.**

  Responsible for project management and conducting field work in relation to the vegetation clearing works for the residential and new school development. Tasks involved conducting pre-clearing fauna and habitat surveys and reporting, management of koala and fauna spotter/catchers during vegetation clearing, nest box installation and monitoring, management of Certified Person in Erosion and Sediment Control (CPESC) subcontractor preparing ESC Plans and monthly auditing, and management of Level 5 Arborist subcontractor providing reporting and advise on tree protection zones.

- **Yatala Industrial Estate Development and Nest Box Monitoring, Yatala, Qld, Australia (2017-2019): BMD Constructions and Fraser Property Group, Project Manager/Ecologist.**

Responsible for fauna spotter catcher works during vegetation clearing, and fauna usage monitoring of 100 next boxes installed for clearing offsets including management of subcontracted arborists.

- **Covella Estate, Greenbank, Qld, Australia (2017 – 2018): SEE Civil, Project Manager and Koala/Fauna Spotter**

  Responsibilities included management of 5 resident Koalas during 90 hectares of bushland clearing, project management and subcontractor management. Preparation of a Wildlife Habitat and Impact Mitigation Plan (WHIMP) and Wildlife Protection and Management Plan (WPMP). Subcontractor management including Level 5 Arborists and Certified Person in Erosion and Sediment Control (CPESC).

- **Gold Coast Country Club, Helensvale, Qld, Australia (2016): CCA Winslow, Lead Aquatic and Terrestrial Fauna Spotter.**

  Responsible for management of 11 dams to be dewatered over several months. Tasks included load reduction trapping and relocation, management and organisation of large aquatic fauna spotter teams managing fish and reptiles during dewatering works. Fauna spotter during tree clearing, and pre-clearance surveys and detailed reporting.

- **Moranbah Flying Fox Dispersal, Moranbah, Qld, Australia (2015): Isaac Regional Council, Field Technician.**

  Field technician during a successful dispersal operation of approximately 15,000 Little Red Flying Foxes from residential areas of Moranbah.

Other smaller projects involving fauna spotter/catcher, fauna management and koala management within South East Queensland include:

- **Brisbane Airport Automall, Pinkenba Qld. Construction Sciences/Cardno (2018-2019).**
  Project Management during vegetation clearing and dewatering. Aquatic/terrestrial Fauna Spotter/Catcher.
- **Coomera Activity Centre, Coomera Qld (2018). SEE Civil**
  Project Management during vegetation clearing and Oaky Creek realignment staged dewatering. Koala management and aquatic/terrestrial Fauna Spotter/Catcher.
- **New England Highway Upgrade, Dalveen Qld (2018). Queensland Bridge and Civil.**
  Project Management, Fauna Spotter/Catcher.
- **Stoneridge Residential Development, Narangba Qld (2016). BMD Constructions.**
  Wallum Froglet targeted relocation and Fauna Spotter/Catcher.
- **Brentwood Forest Estate, Bellbird Park Qld (2016-2019). BMD Urban.**
  Project Management, Koala management and Fauna Spotter/Catcher, ongoing throughout the Project.
- **Providence Estate, South Ripley, Qld (2016-2019). BMD Constructions.**
  Project Management, Fauna Spotter/Catcher, ongoing throughout the Project.
- **Ecco Ripley Estate, Ripley, Qld (2016-2019). BMD Constructions.**
  Project Management, Fauna Spotter/Catcher, ongoing throughout the Project.
- **The Rise Estate, Park Ridge Qld (2016). SEE Civil.**
  Aquatic Fauna Spotter/Catcher during waterbody dewatering.
- **The Crossing Estate, Karalee Qld (2015). Civil Contractors.**
  Fauna Spotter/Catcher, pre-clearance surveys.

PROFESSIONAL DEVELOPMENT

Queensland Construction Card	2015
Venomous Snake Handling	2015
Work Safely at Heights	2016
Operate an Elevated Work Platform (<11 meters)	2017
Enter and Work in Confined Spaces	2017
NSW Order 43 Coal Medical	2019
QLD Coal Board Medical	2022
QLD Standard 11 Surface Operations	2024
Queensland Herbarium (CO2 Ecology) Regional Ecosystem training	2023
Queensland Herbarium (CO2 Ecology) Bio Condition Survey training	2023
Operate a side-by-side utility vehicle	2024
Operate and maintain a 4WD vehicle	2025
First Aid Certificate and CPR	2025

PROFESSIONAL HISTORY

WSP – Ecologist	2019 – Present
Biodiversity Australia – Operations Manager – Fauna Division	2017 – 2019
Biodiversity Australia/Naturecall Environmental – Fauna Field Ecologist	2015 – 2017
International Student Volunteers – Project Leader (seasonal)	2013, 2015 & 2016
Menzies Aviation – Aircraft Dispatch and Passenger Services	2013 - 2016
Hydrobiology – Laboratory Assistant (seasonal)	2013 - 2014
Queensland Museum of Science Southbank – Research Assistant	2010 - 2011

About Us

WSP is one of the world's leading engineering professional services consulting firms, bringing together approximately 65,000+ talented people around the globe. We are technical experts who design and provide strategic advice on sustainable solutions and engineer Future ReadyTM projects that will help societies grow for lifetimes to come. wsp.com