Terrestrial Fauna Impact Assessment

Karara Iron Ore Project Mine Life Extension

Final

September 2025

umwelt

KARARA MINING LTD

Terrestrial Fauna Impact Assessment

Karara Iron Ore Project Mine Life Extension

Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Karara Mining Limited

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Document Status

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Executive Summary

Karara Mining Limited (KML) operates the Karara Iron Ore Project (KIOP) and Mungada Iron Ore Project (MIOP), both located approximately 225 km east-southeast of Geraldton in the Midwest region of Western Australia (WA).

KIOP was approved under Ministerial Statement (MS) 805 in 2009 and consists of the Karara open-cut magnetite pit, a processing plant to produce magnetite concentrate, a waste rock dump (WRD), tailings storage facility (TSF), rail loading facilities, accommodation facilities, airport, access roads and linear infrastructure corridor.

MIOP was approved under MS 806 in 2009 and consists of the Blue Hills North and Terapod pits and WRDs and regional infrastructure. Mining was completed in 2014, and MIOP is currently in suspension from active mining. However, infrastructure such as pipelines, access roads, laydown areas, powerlines, rail siding and pits for water storage approved under MIOP are currently utilised by KIOP.

KML is proposing to further develop the KIOP with a Mine Life Extension (MLE), which includes an expansion to the MS 805 development envelope, an extension to the WRD and TSF, and the incorporation of infrastructure at MIOP and previously cleared areas approved under Native Vegetation Clearing Permits (NVCPs) (including the western section of the Yandanooka water pipeline, the rail loop and the Syncline Turner haul road).

An impact assessment was undertaken for terrestrial fauna within the proposed expansion area, referred to as the KIOP MLE new disturbance footprint (also referred to as 'the KIOP MLE Proposal'), which has a maximum disturbance area of 1,522 hectares (ha). The KIOP MLE new disturbance footprint is entirely contained within the development envelope (referred to as the Combined Proposal development envelope or Combined Proposal DE), which is approximately 13,557 ha in size and spans approximately 143 km.

Within the KIOP MLE new disturbance footprint, a total of 27 fauna species of conservation significance were considered Resident (i.e. species with a population permanently present in the KIOP MLE new disturbance footprint) or Regular Visitor (species that regularly occur within the KIOP MLE new disturbance footprint in at least moderate numbers, such as part of an annual cycle). The KIOP MLE Proposal is predicted to directly and indirectly impact habitat for all 27 species, including five species that are listed as threatened under the WA *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- Gilled Slender Blue-tongue (WA: VU).
- Malleefowl (WA: VU; EPBC: VU).
- Ornate Trapdoor Spider (WA: EN).
- Southern Whiteface (WA: VU; EPBC: VU).
- Western Spiny-tailed Skink (WA: VU; EPBC: EN).

An assessment against the *WA Environmental Offsets Guidelines* residual impact significance model (GoWA, 2014) was undertaken for all 27 species, which determined that residual impact to the following six species are significant or potentially significant and will / may require an offset:

- Significant residual impact that will require an offset:
    - Gilled Slender Blue-tongue (WA: VU).
    - Malleefowl (WA: VU; EPBC: VU).
    - Western Spiny-tailed Skink (WA: VU; EPBC: EN).
- Potentially significant residual impact that may require an offset:
    - Long-tailed Dunnart (WA: Priority (P) 4).
    - Karara Millipede (*Antichiropus* sp. nov. 'Karara').
    - Mt Gairdner Scorpion (*Urodacus* sp. nov. 'Mt Gairdner').

Abbreviations

Abbreviation	Definition
ALA	Atlas of Living Australia
BC Act	*Biodiversity Conservation Act 2016*
CAA 1	Cumulative Assessment Area 1
CAA 2	Cumulative Assessment Area 2
CCAC	Currently Cleared or Approved to be Cleared (as defined in **Section 1.2**)
CR	Critically Endangered
CS	Conservation Significance
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DE	Development Envelope
DMPE	Department of Mines, Petroleum and Exploration
DoE	Department of the Environment
DPIRD	Department of Primary Industry and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EN	Endangered
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
IBRA	Interim Biogeographic Regionalisation of Australia
IBSA	Index of Biodiversity Assessments
KIOP	Karara Iron Ore Project
KIOP MLE	Karara Iron Ore Project Mine Life Extension
KML	Karara Mining Limited
MI	Migratory
MIOP	Mungada Iron Ore Project
MLE	Mine Life Extension
MNES	Matter of National Environmental Significance
MS	Ministerial Statement
NSW	New South Wales
NT	Northern Territory
NVCP	Native Vegetation Clearing Permit
OS	Species otherwise in need of special protection (other specially protected)
P	Priority
PEVSA	Pre-European Vegetation System Association
SA	South Australia

Abbreviation	Definition
SRE	Short Range Endemic
T	Threatened
TSF	Tailings Storage Facility
VSA	Vegetation and Substrate Association
VT	Vegetation Type
VU	Vulnerable
WA	Western Australia
WRD	Waste Rock Dump
WSTS	Western Spiny-tailed Skink

Contents

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1.0 Introduction

1.1 Overview

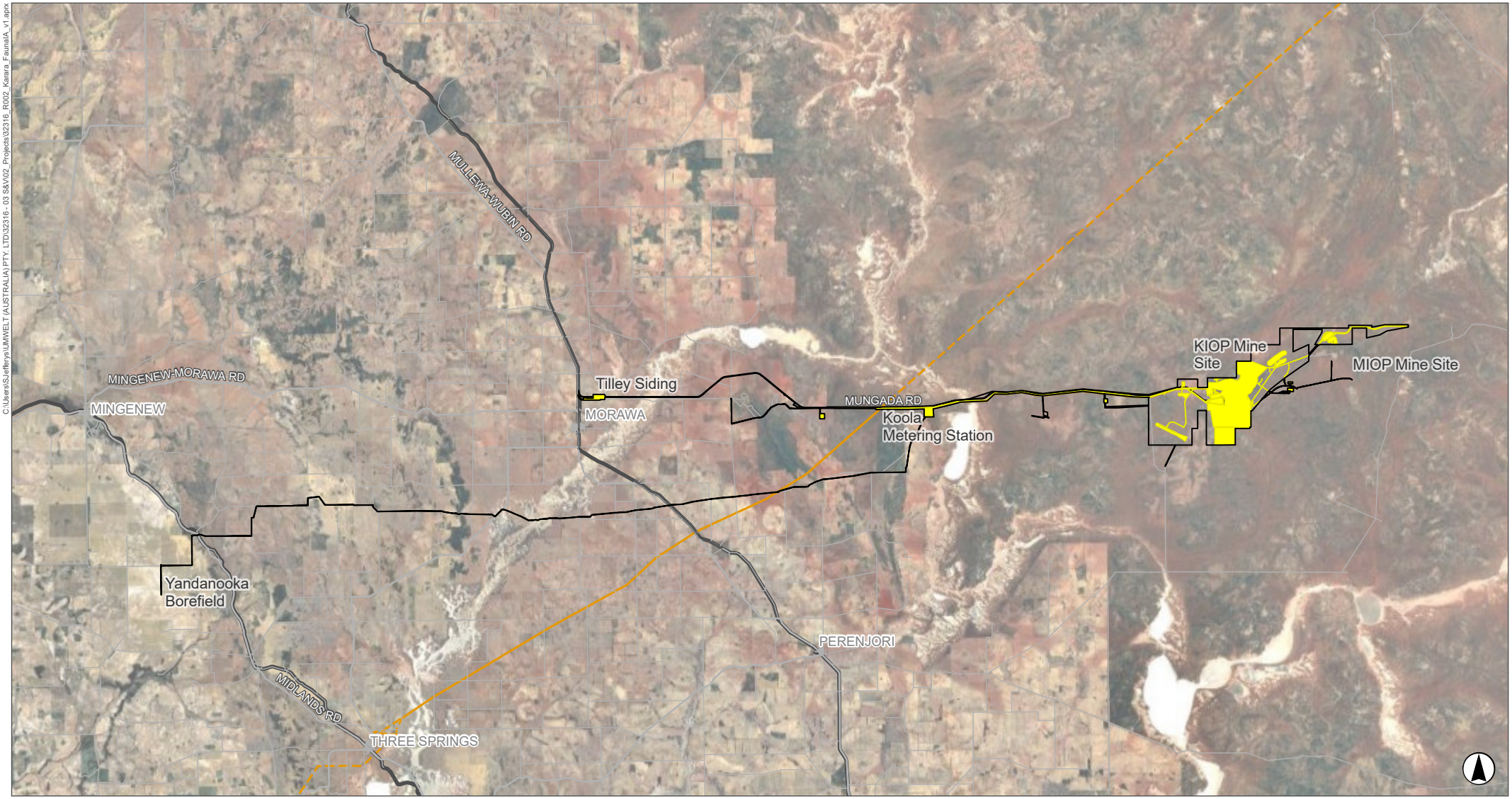
Karara Mining Limited (KML) operates the Karara Iron Ore Project (KIOP) and Mungada Iron Ore Project (MIOP), both located approximately 225 km east-southeast of Geraldton in the Midwest region of Western Australia (WA) (**Figure 1.1**).

KIOP was approved under Ministerial Statement (MS) 805 in 2009 and consists of the Karara open-cut magnetite pit, a processing plant to produce magnetite concentrate, a waste rock dump (WRD), tailings storage facility (TSF), rail loading facilities, accommodation facilities, airport, access roads and linear infrastructure corridor.

MIOP was approved under MS 806 in 2009 and consists of the Blue Hills North and Terapod pits and WRDs and regional infrastructure. Mining was completed in 2014, and MIOP is currently in suspension from active mining. However, infrastructure such as pipelines, access roads, laydown areas, powerlines, rail siding and pits for water storage approved under MIOP are currently utilised by KIOP.

KML is proposing to further develop the KIOP with a Mine Life Extension (MLE), which includes an expansion to the MS 805 Development Envelope (DE), an extension to the WRD and TSF, and the incorporation of infrastructure at MIOP and previously cleared areas approved under Native Vegetation Clearing Permits (NVCPs) (including the western section of the Yandanooka water pipeline, the rail loop and the Syncline Turner haul road).

In 2022, Umwelt completed a flora, vegetation and fauna impact assessment for the proposed KIOP MLE project (Umwelt, 2022). However, changes were made to the development envelope since that impact assessment was completed. This current impact assessment report has been prepared to provide an update to the previous impact assessment report. This report incorporates the latest findings of recent terrestrial fauna surveys conducted in the development envelope in 2024 by Bamford Consulting Ecologists (Kristancic & Bamford, 2025), addresses regulator comments, and presents an updated assessment of potential impacts to terrestrial fauna.



Legend

- Combined Proposal Development Envelope
- Combined Proposal Disturbance Footprint
- Main Road
- Minor Road
- Railway
- Electricity Transmission Powerline

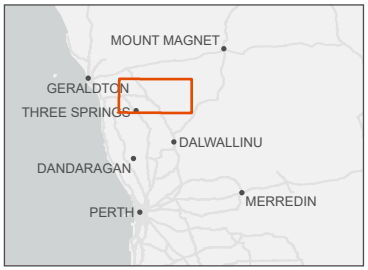


FIGURE 1.1
Proposal Location

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

0 12 24 km

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025)

1.2 Assessment Areas and Definitions

Multiple areas have been defined to conduct this impact assessment to determine potential direct, indirect and cumulative impacts to terrestrial fauna. These areas are defined in the following sections and presented in the subsequent figures (where relevant).

For all potential impacts, this assessment took into account areas that have been previously cleared, as well as areas that have not been cleared but have been previously approved for clearing under (now expired) NVCPs (see **Section 1.3.1**). These areas have been referred to as **currently cleared or approved to be cleared (CCAC), and include:**

- Areas mapped as 'cleared land' by Umwelt (2025a) and Woodman Environmental (2012).
- Areas within KML's on-ground disturbance footprint spatial dataset (dated 19 March 2025) (KML, 2025).
- For the cumulative impact assessment of the western end of the development envelope: areas outside the Department of Primary Industries and Regional Development (DPIRD) Native Vegetation Extent spatial dataset (DPIRD-005) (dated 19 June 2023) (DPIRD, 2025).
- Development footprint areas approved under MS 805 and MS 806.

1.2.1 Direct Impact Assessment

The areas utilised for the assessment of direct impacts to fauna as a result of the Combined Proposal include:

- **Combined Proposal development envelope (Combined Proposal DE):** This boundary includes the KIOP MLE new disturbance footprint (defined below) and has an area of 13,557 ha (**Figure 1.2**). The Combined Proposal DE spans approximately 143 km, and for the purpose of this assessment has been split into four major areas as per **Figure 1.3**, which are hereafter named:
    - **Karara Area:** from east of Mungada Ridge National Park; encompassing the Karara mine site, airstrip and camp.
    - **Yandanooka Pipeline:** linear corridor extending west along Mungada Road to Koolanooka Hills.
    - **Tilley Siding:** small, disjunct area north of Morawa near Tilley Station.
    - **Borefield Corridor:** linear corridor extending west from near Bowgarder Nature Reserve to near Yandanooka.
- **KIOP MLE new disturbance footprint:** The proposed expansion, referred to as the KIOP MLE new disturbance footprint (also referred to as 'the KIOP MLE Proposal'), has a maximum disturbance area of 1,522 ha (**Figure 1.2**). The KIOP MLE new disturbance footprint is entirely contained within the Combined Proposal DE, and is comprised of two disjunct areas as per **Figure 1.3**, hereafter named:
    - **Mine Area:** comprises infrastructure corridors, Karara pit, TSF, and WRDs. The Mine Area is entirely contained within the Karara Area of the Combined Proposal DE.
    - **Wheatbelt Area:** small linear area along the western end of the Borefield Corridor.

- **Combined Proposal disturbance footprint (Combined Proposal DF):** The Combined Proposal DF has a maximum disturbance area of 5,040 ha and includes the KIOP MLE new disturbance footprint and several areas previously approved under MS 805 and MS 806 (**Figure 1.2**). However, the sum of these individual areas is not equal to the Combined Proposal DF area, which is approximately 571 ha larger than the Combined Proposal DF. This is due to the removal of overlapping areas between the MS 805 and MS 806 disturbance footprints, previously approved areas which are located outside the current development envelope, and several corrections to erroneous spatial data.

1.2.2 Indirect Impact Assessment

Quantification of potential indirect impacts was undertaken using an area surrounding the KIOP MLE new disturbance footprint, which has been referred to as the **indirect impact zone** (**Figure 1.4**). This boundary was generated as described below:

- A buffer of 50 m on the Mine Area, excluding several minor portions of the KIOP MLE new disturbance footprint which are distanced from the main operations (e.g. a small access road northeast of the pit, infrastructure to the north of the WRD and the area around the accommodation village; these excluded areas only received a 10 m buffer). This buffer accounts for potential indirect impacts such as vibration, noise and light impacts, accidental leakage of potentially environmentally hazardous materials such as hydrocarbons, and accidental land clearing.
- A buffer of 10 m applied to the Syncline Turner Haul Road Project and the Borefield Corridor portions of the KIOP MLE new disturbance footprint. This buffer accounts for potential indirect impacts such as noise.

The indirect impact zone excludes any CCAC areas, including areas within the KIOP MLE new disturbance footprint previously approved under MS 805 or MS 806. The indirect impact zone extends outside the Combined Proposal DE in some places.

1.2.3 Cumulative Impact Assessment

The cumulative impact assessments considered the areas that would be directly impacted by the Combined Proposal DF (which includes the KIOP MLE new disturbance footprint). The assessment also included existing impacts from CCAC land (where data was available).

Given the distance between the Mine Area and Wheatbelt Area (approximately 97 km), and that the Mine Area and Wheatbelt Area occur within dissimilar landscapes with highly dissimilar historical threatening processes, two separate assessment areas were defined for the cumulative impact assessment:

- **Cumulative Assessment Area 1 (CAA 1):** defined for the cumulative impact assessment of the Mine Area, and represents a 15 km buffer on the Mine Area boundary.
- **Cumulative Assessment Area 2 (CAA 2):** defined for the cumulative impact assessment of the Wheatbelt Area, and represents a 15 km buffer on the Wheatbelt Area boundary.

1.3 Purpose and Scope

This report presents a summary of the significant characteristics of the Combined Proposal with respect to terrestrial fauna, and an assessment of potential associated aspects that may impact fauna. It includes discussion of the potential significance of any impacts using existing data and information recently collected by the BCE 2024 fauna survey (Kristancic & Bamford, 2025).

While this report assesses the Combined Proposal DF, the primary focus is the KIOP MLE new disturbance footprint, as the latter comprises vegetation not directly impacted by current (or previously approved) mining activities.

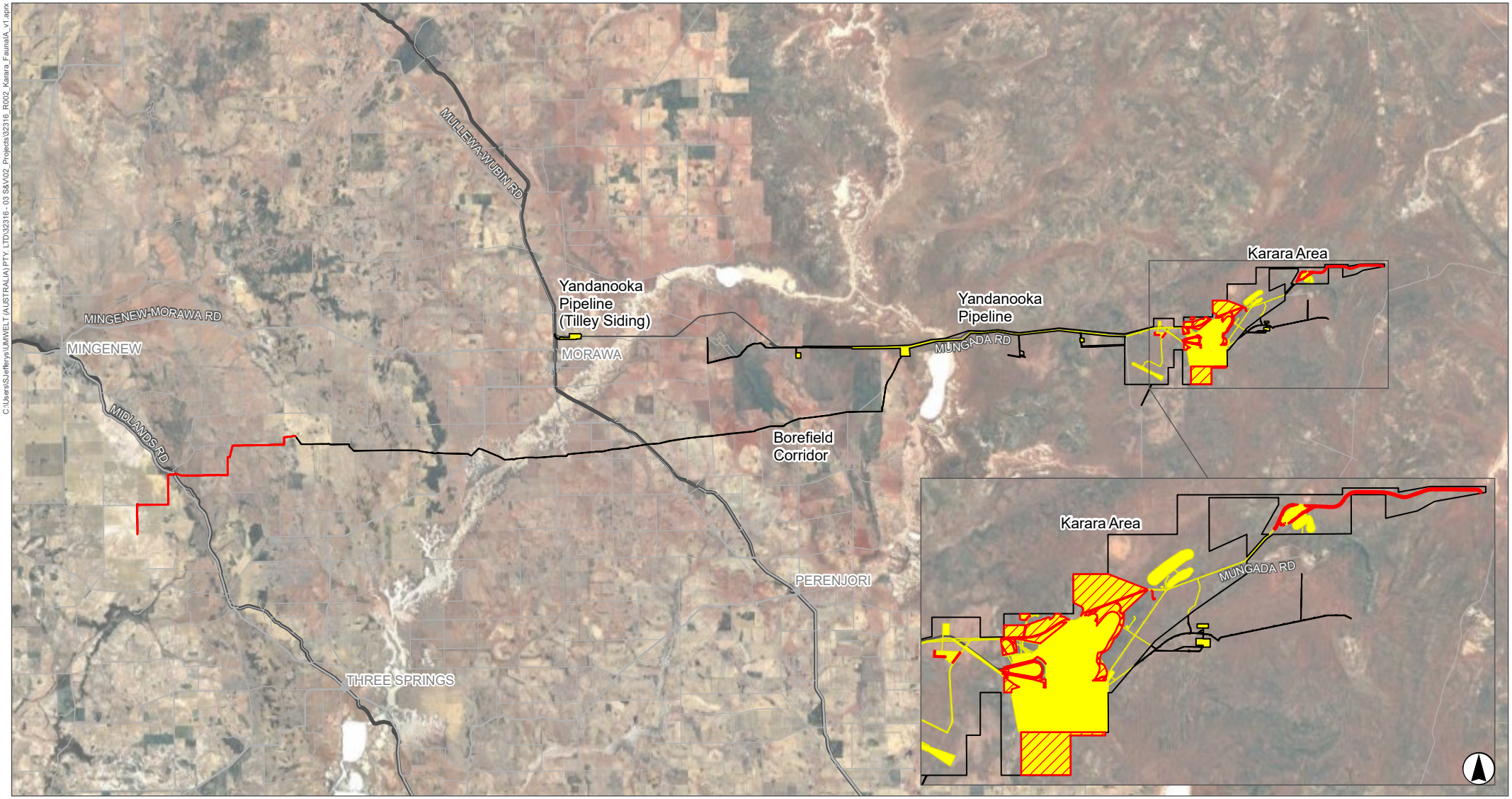
Direct, indirect, and historical impacts are presented as quantitative data where possible. Where impacts cannot be assessed quantitatively, a qualitative discussion is presented instead.

1.3.1 Historic NVCPs

Table 1.1 lists all previous NVCPs (expired) that intersect the Combined Proposal DF. Of these areas, approximately 194.57 ha (12.78%) overlap the KIOP MLE new disturbance footprint, and 271.30 ha (5.38%) overlap the Combined Proposal DF. Of the 271.30 ha previously approved, 241.32 ha (88.95%) is located within areas currently mapped as cleared or approved to be cleared (under MS 805 and MS 806) (i.e. CCAC).

Table 1.1 Relevant Historic NVCPs

NVCP No.	Colloquial Name or Purpose	Total NVCP Approved Area	Overlap with the Combined Proposal DF
		ha	ha
3399/4	Karara Rail Loop	67.00	34.89
3518/4	'Railway construction or maintenance'	298.10	6.21
3603/2	'Railway construction or maintenance'	243.32	52.37
3740/1	Weelhamby Borrow Pit	12.70	3.22
3867/1	Yandanooka Borefield	76.01	75.96
3961/4	Eneabba to Koolanooka via Three Springs Transmission Lines	973.18	0.63
5605/2	Syncline Turner Haul Road Project	121.33	98.02



Legend

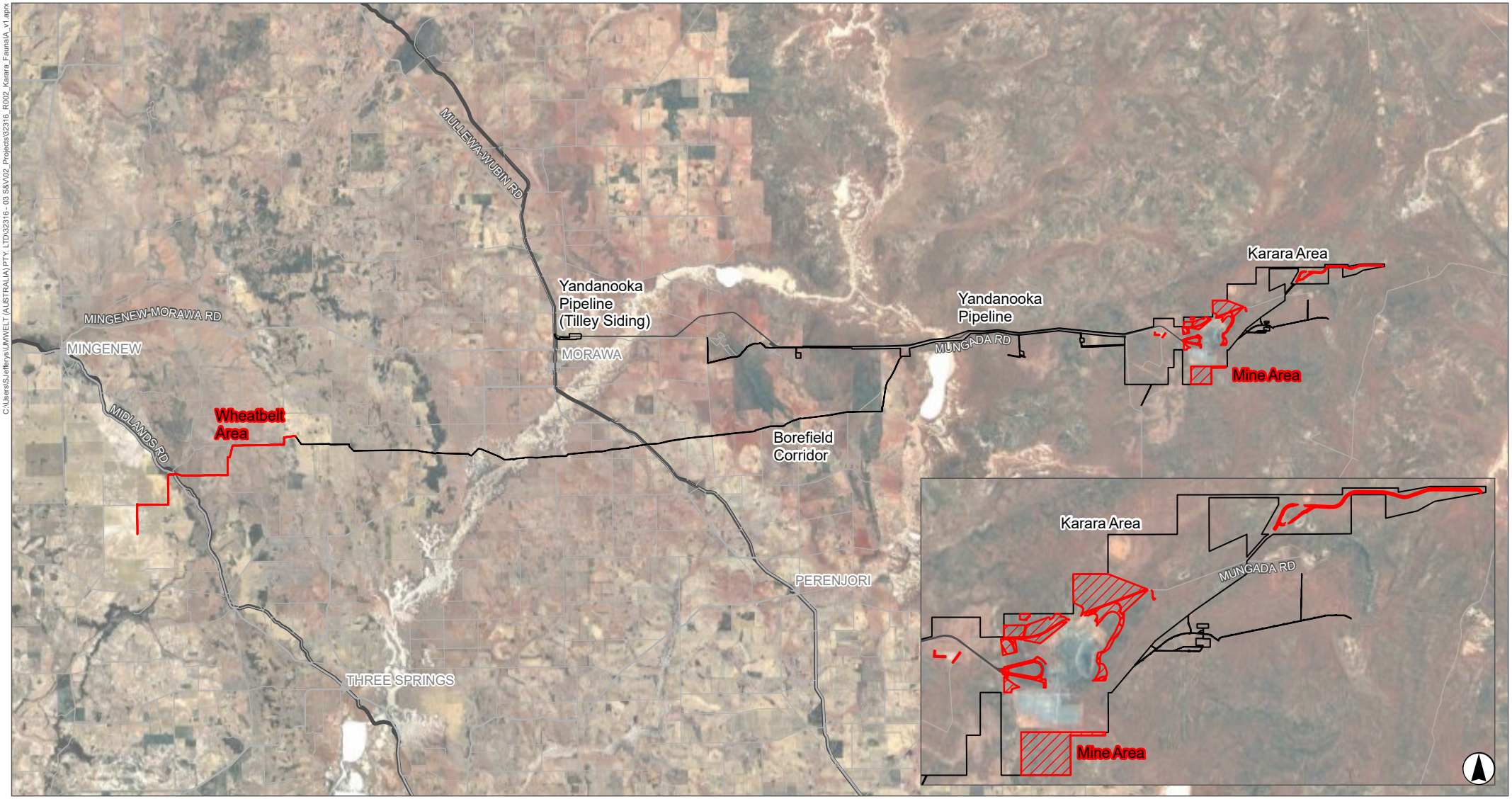
- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Combined Proposal Disturbance Footprint
- Main Road
- Minor Road
- Railway

FIGURE 1.2
Impact Assessment Areas

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

0 12 24 km

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025)



Legend

- KIOP MLE New Disturbance Footprint
- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

FIGURE 1.3
Combined Proposal Development Envelope

Scale: 1:600,000 at A4, GDA2020 MGA Zone 50

0 12 24 km

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025)

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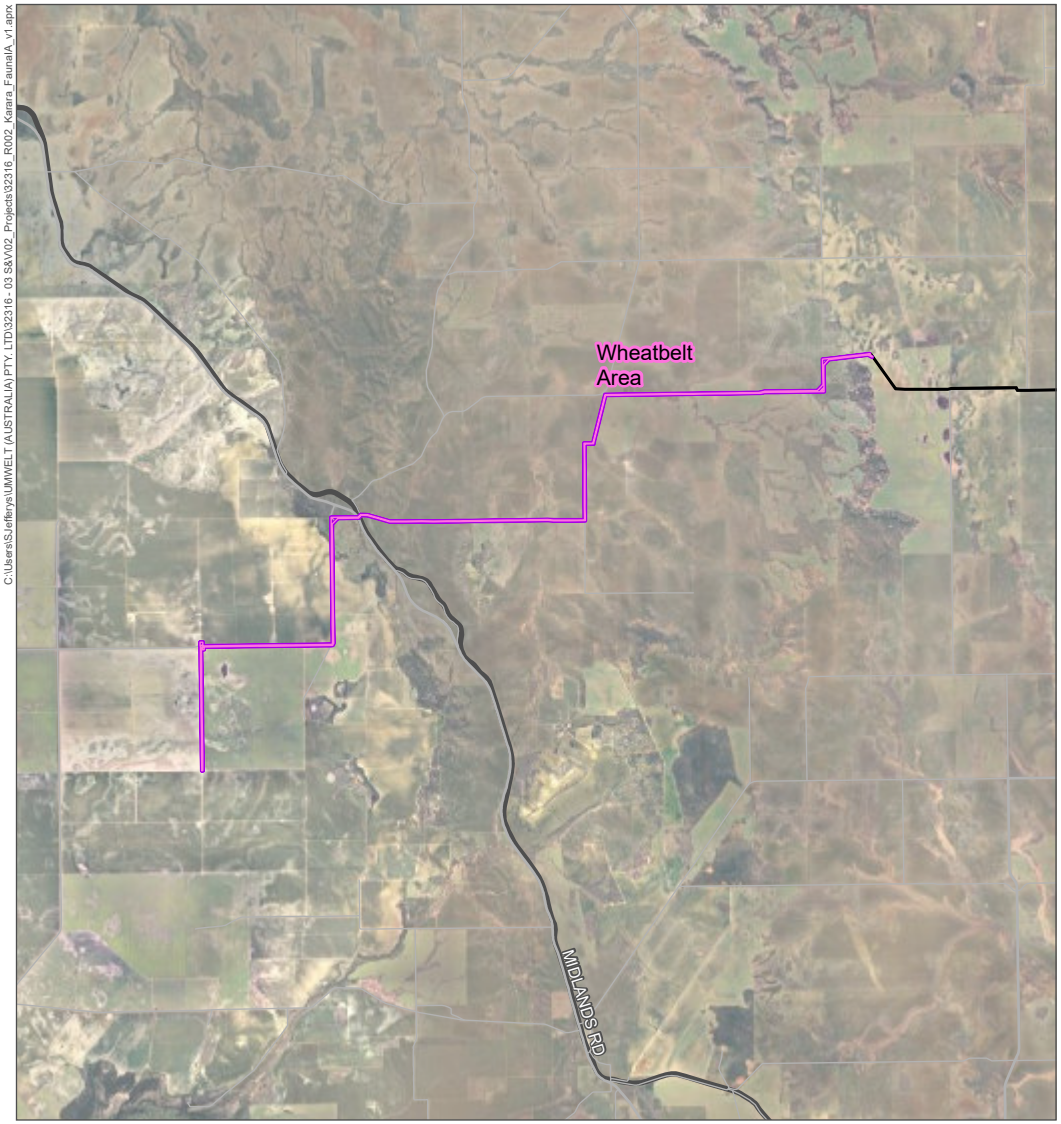
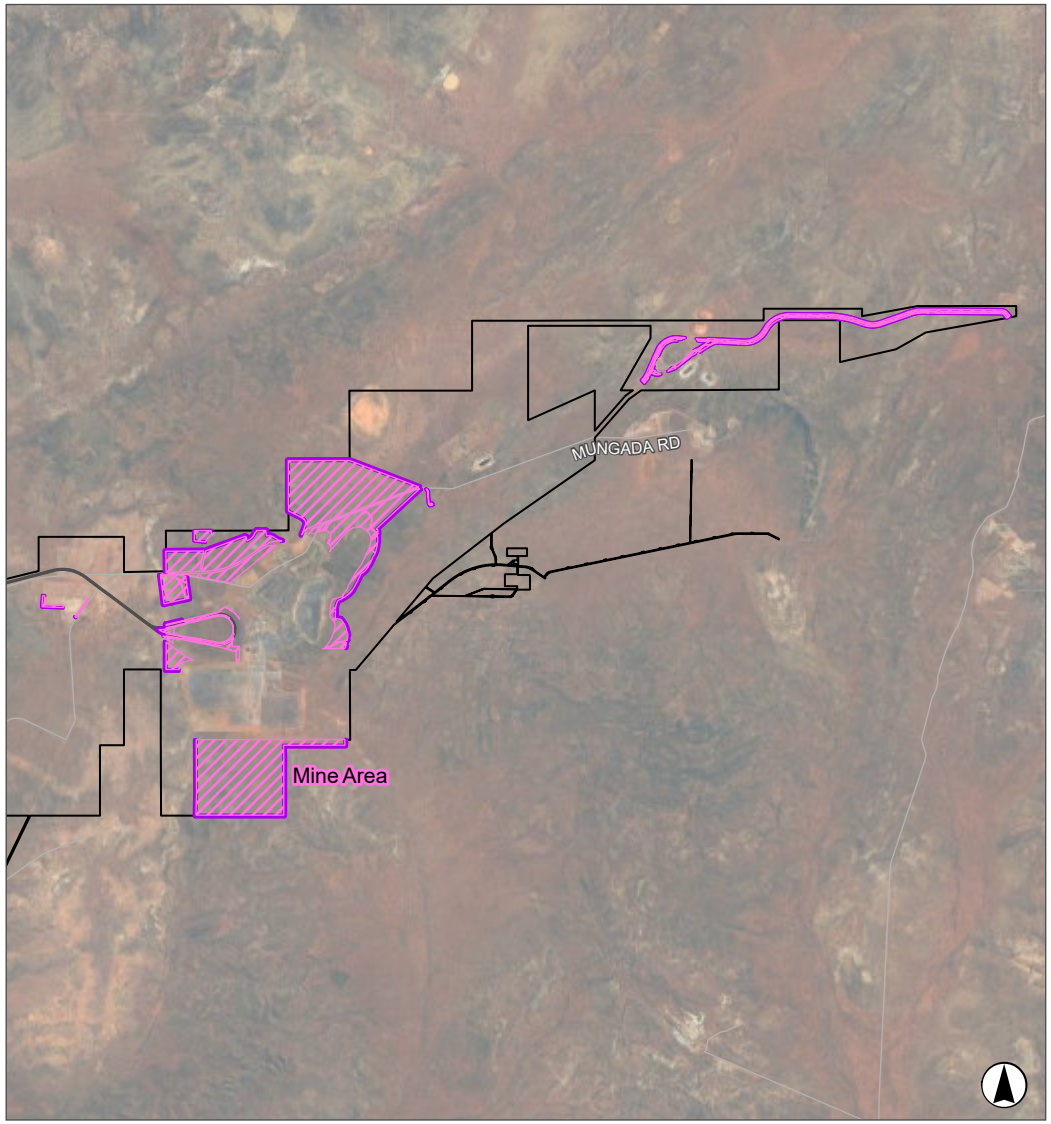




Legend

- KIOP MLE New Disturbance Footprint
- Indirect Impact Zone
- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

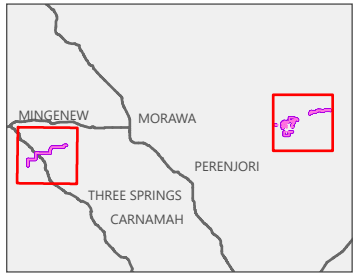


FIGURE 1.4
Indirect Impact Zone

Scale: 1:200,000 at A4, GDA2020 MGA Zone 50

0 4 8 km

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025)

1.3.2 Other Projects in the Region

KML has other activities in the region, including the Hinge Iron Ore Project (HIOP, MS 968) which is no longer in operation; and several NVCPs including the Karara Rail Loop (NVCP 3399), Yandanooka Borefield (NVCP 3867), Syncline Turner Haul Road Project (NVCP 5605), and part of the Eneabba to Koolanooka via Three Springs Transmission Lines (NVCP 3961/4).

The Blue Hills Mungada East Expansion Project (Mungada East, MS 1071) is the other dominant mining operation in the Blue Hills area. This project is owned by Sinosteel Midwest Corporation Limited (SMC). Approved in late 2017, the project is an extension of the existing Koolanooka/Blue Hills Mungada Direct Shipping Ore Project (DSO Project, MS 811) and is located northeast of the main KIOP site.

Where relevant, these areas have been included as part of the cumulative impact assessment (see **Section 4.3** and **Section 6.3**).

2.0 Relevant Studies

2.1 BCE 2025

In 2024, BCE conducted a targeted terrestrial fauna assessment within a study area equivalent to the KIOP MLE new disturbance footprint (1,522 ha), and a review of existing data relevant to the Combined Proposal DE (13,557 ha). This assessment is hereafter referred to as 'BCE 2025'. The purpose of the BCE 2025 assessment was to characterise the terrestrial fauna values of the study area, and build on existing data (including that collected for the KIOP MLE project in 2020 (M. Bamford, 2021)), to provide adequate and updated information to inform a fauna impact assessment.

The survey was completed as a 'targeted' assessment as defined in section 4.3 of the Environmental Protection Authority (EPA) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA, 2020a). This level of survey was chosen to gather information on significant fauna and/or habitats of the study area. In addition, BCE have undertaken extensive previous surveys in the immediate area for KIOP at the 'detailed' level as per section 4.2 of EPA guidance (2020a), as well as desktop studies as per section 2 of EPA guidance.

The BCE 2025 assessment builds on extensive previous surveys conducted for KIOP and within the immediate surrounding area (**Table 2.1**), thus providing suitable, current information to be used for the assessment of direct impacts to terrestrial fauna within the Combined Proposal area. The key results of the assessment are presented in **Section 3.0**.

The survey was completed in accordance with current policy and guidelines:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA, 2016a).
- *Technical Guidance – Sampling of Short Range Endemic Invertebrate Fauna* (EPA, 2016b).
- *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA, 2020a).
- *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)* (EPA 2020c).

The assessment methods and effort included:

- Desktop assessment for an area comprising a 40 km buffer of the Combined Proposal DE. The desktop assessment included database searches and review of relevant literature as listed below:
    - Birdata (BirdLife Australia, 2024).
    - Atlas of Living Australia (ALA) Spatial Portal (ALA, 2024).
    - Department of Biodiversity, Conservation and Attractions (DBCA) Threatened and Priority Fauna database (DBCA, 2024a).
    - DBCA NatureMap Threatened and Priority Fauna database (DBCA, 2024b).
    - Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (DCCEEW, 2024b).
    - BCE records from surveys from around KIOP between 2004 and 2020, and from around the Wheatbelt Area in 1991 (Read, 1992) (**Table 2.1**).

- KML monitoring data of Malleefowl mounds and Western Spiny-tailed Skink colonies from the Karara Area and surrounds (monitoring of these features has been conducted approximately annually to provide an approximation of the abundance of active individuals in the area).

- Targeted terrestrial fauna survey within the KIOP MLE new disturbance footprint and wider Combined Proposal DE, undertaken over three site visits:
  - 19 to 28 June 2020 (40 person days).
  - 27 June to 3 July 2024 (28 person days).
  - 7 November 2024 (2 person days).
- Field survey methods in 2020 and 2024 included:
  - Walked transects across the Mine Area via transects spaced at 400-500 m intervals with personnel approximately 30-50 m apart in each transect.
  - Systematic recording of presence of Malleefowl mounds and information on width, height, profile and activity status (the latter two parameters recorded in line with national guidelines (NMRT, 2020) supplemented with methods developed by BCE).
  - Targeted searches for Gilled Slender Blue-tongue by turning over rocks within rocky areas.
  - Randomly selected walked transects across the Mine Area at 50 m by 2 m spacing to estimate *Idiosoma* spider density.
  - Intensive *Idiosoma* spider searches for at least 10 minutes around a point with a radius of up to 50 m.
  - Opportunistic searches for *Idiosoma* spider burrows, and where required, investigation of burrow contents with a milliscope or via excavation to identify the burrows as those of Northern Shield-backed Trapdoor Spider or the Ornate Trapdoor Spider.
  - Searches for Western Spiny-tailed Skink habitat, i.e. log piles (usually York Gum but occasionally other large trees such as *Melaleuca* spp.). Each pile was checked for scats to determine if a log pile was occupied.
  - Combination of walked transects and observations made from a slow-moving vehicle in the Wheatbelt Area.
  - Opportunistic observations on other fauna, including bird sightings and evidence of tracks and scats.
  - Recording of key information while undertaking the above sampling methods including vegetation, soils and landform characteristics.
- Assessment of the composition of the expected vertebrate fauna assemblage of the KIOP MLE new disturbance footprint.
- Discussion of significant fauna species that were expected to be present in the KIOP MLE new disturbance footprint.
- Description and mapping of fauna habitat types, referred to as vegetation and substrate associations (VSAs), across the Combined Proposal DE. These VSAs were based on vegetation types (VTs) defined and mapped by Umwelt (2025a) in the Combined Proposal DE.

- Discussion of patterns of biodiversity and local ecological processes of the KIOP MLE new disturbance footprint.
- Assessment of the potential limitations of the assessment per the requirements of *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA, 2020a).

Table 2.1 Local Terrestrial Fauna Surveys Utilised for the BCE 2025 Assessment of the Combined Proposal DE

Title and Author	Survey Year	Scope per Current EPA (2020b) Definitions		
		Basic	Detailed	Targeted
Inering 'Save the Bush' Project: Bush Management Strategy (Read, 1992)	1991		✓	
Blue Hills fauna assessment (M. J. Bamford & Wilcox, 2004)	2004		✓	
Fauna Values of Gindalbie Metal's Karara and Mungunda Haematite/Magnetite Projects (Bancroft & Bamford, 2007)	2006		✓	✓
Investigations into the Distribution of the Shield-backed Trapdoor Spider and Woolley's *Pseudantechinus* in the Karara/Mungada Area, July 2007 (M. J. Bamford & Smith, 2007). Report into Investigations into the Status of Woolley's *Pseudantechinus* and the Shield-backed Trapdoor Spider; June 2008 (M. J. Bamford & Metcalf, 2008)	2007-2008			✓
Surveys for Mounds of the Malleefowl *Leipoa ocellata* in the Karara area, July 2008 (M. J. Bamford, 2008)	2008			✓
Surveys for Western Spiny-tailed Skinks *Egernia stokesii badia* (M. J. Bamford & Harris, 2008). Survey and Habitat Assessment of the Western Spiny-tailed Skink, *Egernia stokesii badia*, in the Karara Infrastructure area, August 2009 (M. Bamford et al., 2009)	2008			✓
Assessment of Fauna Values of Alternative Airstrip, Accommodation Camp Site and Communications Tower (M. J. Bamford & Huang, 2009)	2009	✓		✓
Hinge Project Area Fauna Assessment (Basnett & Bamford, 2013)	2011-2012	✓		✓
Karara Iron Ore Project Fauna Assessment of the Plant Expansion Area, August 2012 (Everard & Bamford, 2012)	2012	✓		✓
Review of the Monitoring Programme for the Western Spiny-tailed Skink at Karara (M. J. Bamford, 2014, 2017)	2014, 2017			✓
Annual Monitoring Survey of the Shield-backed Trapdoor Spider 2010 to 2019 (Bancroft & Bamford, 2019)	2010-2019			✓
Karara Iron Ore Project Mine Life Extension Fauna Assessment of Proposed Development Envelopes 2024 (Kristancic & Bamford, 2025)	2020, 2024	✓		✓
CBH Mingenew Level 1 Fauna Assessment and Black-Cockatoo Assessment (Kristancic, Wadey, et al., 2023)	2023	✓		✓
Perenjori Fauna Assessment (Kristancic, Bleby, et al., 2023)	2023	✓		
CBH Coorow Black-Cockatoo Assessment (Kristancic et al., 2024)	2024			✓

Source: Kristancic & Bamford (2025).

2.2 Supporting Studies

This impact assessment has been supported by multiple terrestrial fauna studies that have been completed within the Combined Proposal DF and Cumulative Assessment Areas, including those utilised for the BCE 2025 assessment as presented in **Table 2.1**. Studies and datasets (additional to those presented in **Table 2.1**) that have been specifically utilised to calculate potential direct, indirect, and cumulative regional impacts to fauna values are listed in **Table 2.2**.

Table 2.2 Studies and Datasets Used to Calculate Potential Impacts to Environmental Values

Title and Author	Description	Environmental Value	Application to Impact Assessment			
			Direct Impacts	Indirect Impacts	Cumulative Impacts	
					CAA 1	CAA 2
Karara Iron Ore Project Mine Life Extension: Fauna Assessment of Proposed Disturbance Areas, 2020 and 2024 (i.e. 'BCE 2025')	Targeted terrestrial fauna assessment, incorporating data from relevant historical sources	Significant Fauna	✓	✓		
		Fauna Habitat	✓	✓	-	-
2023 and 2024 Detailed and Targeted Flora and Vegetation Assessment: Karara Iron Ore Project Mine Life Extension (Umwelt, 2025a)	Detailed and targeted flora and vegetation assessment, incorporating data from relevant historical sources	Fauna Habitat (derived from vegetation types)	✓	✓	-	-
Various terrestrial fauna assessments undertaken in the area by BCE (**Table 2.2**)	Various basic, detailed and targeted terrestrial fauna assessments	Significant Fauna	✓	✓	✓	✓
Pre-European Vegetation spatial dataset (DPIRD-006) (DPIRD 2019)	Mapping of original native vegetation presumed to have existed prior to European settlement in WA	Fauna Habitat	-	-	✓	✓
Native Vegetation Extent spatial dataset (DPIRD-005) (DPIRD, 2025)	Mapping of the extent of remnant vegetation in WA. Dataset last updated – and therefore presumed current to – 19 June 2023	Fauna Habitat	-	-	-	✓

3.0 Receiving Environment

The following subsections present a summary of the fauna values of the Combined Proposal DE as described by the BCE 2025 assessment.

3.1 Fauna Habitats

A total of 12 VSAs representing fauna habitats were defined and mapped within the Combined Proposal DE. Of these VSAs, eight were mapped in the Mine Area of the KIOP MLE new disturbance footprint and five in the Wheatbelt Area. With the exception of VSA 10 (i.e. cleared land), only VSAs 3 and 7 occur in both the Mine Area and the Wheatbelt Area.

The VSAs of the Combined Proposal DE generally correspond to VTs as mapped by Umwelt (2025a). The VSAs also have potentially equivalent pre-European vegetation system associations (PEVSAs). These were determined by Umwelt following review of PEVSA descriptions and mapped extents against those of VTs across the Combined Proposal DE and surrounds.

Note that VT AB is additional to the VTs defined by Umwelt (2025a) as it occurs within the indirect impact area only. This VT was defined and mapped by Umwelt (2025b) for the flora and vegetation impact assessment of the KIOP MLE Proposal. Given VT AB is not present in the Combined Proposal DE, it was not correlated to a VSA by the BCE 2025 assessment. For the purpose of the fauna impact assessment, this VT was assigned by Umwelt (2025c) to VSA 3 by a Principal Ecologist familiar with the area following review of habitat and vegetation data.

The VSAs of the Combined Proposal DE are defined in **Table 3.1** and presented in **Figure 3.1**.

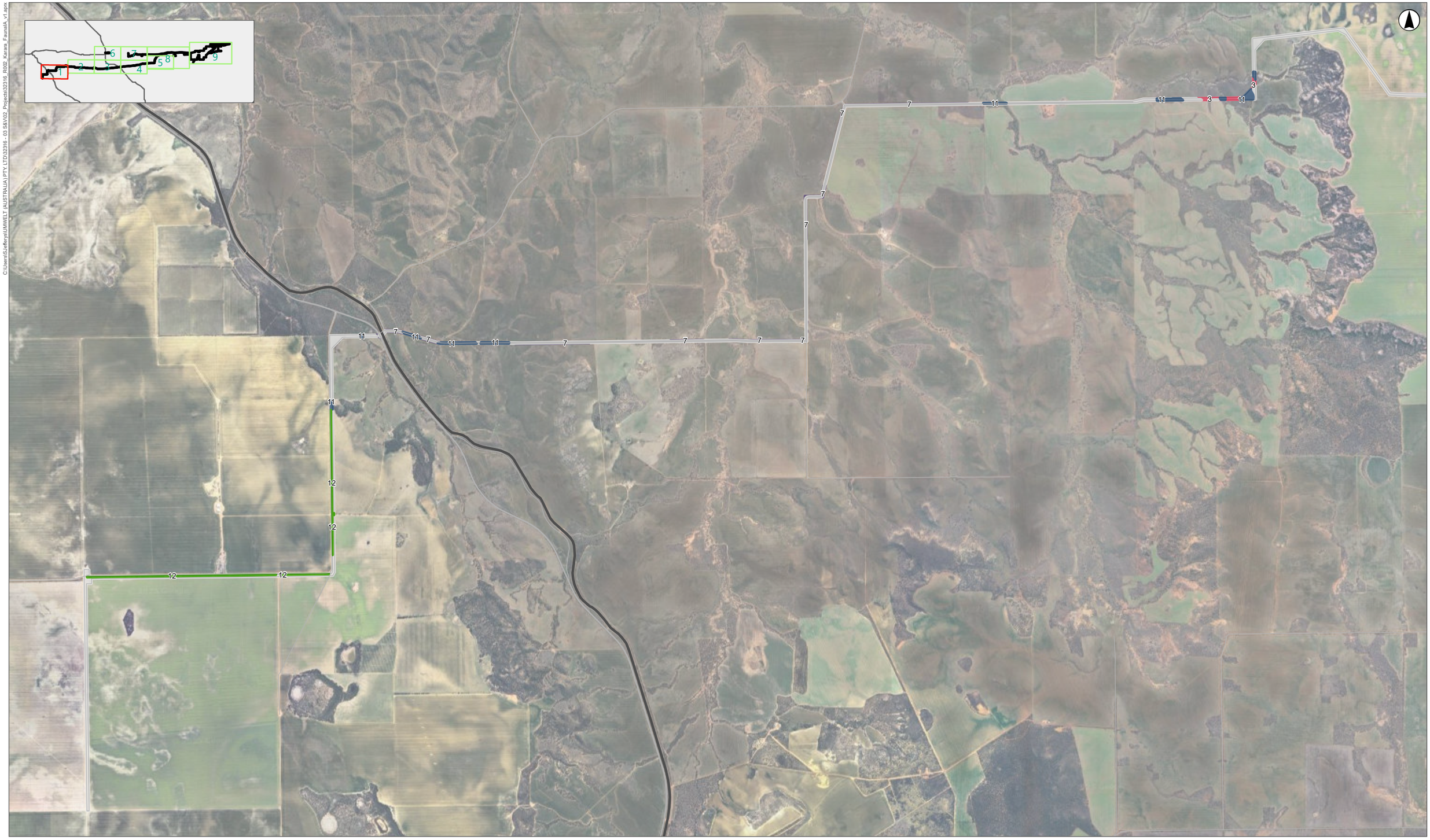
Table 3.1 VSAs of the Combined Proposal DE

VSA	VSA Name	Description	Mine Area	Wheatbelt Area	Associated VT (Umwelt, 2025a)	Equivalent PEVSA
1	Breakaways and rocky ridges	These are isolated and scattered and most appear to be laterite or with some ironstone. Breakaways and rocky ridges support scattered mostly low acacias forming a moderately dense to open shrubland. Occurs within the Mine Area and surrounding Combined Proposal DE, and in small, scattered areas to the west of the Karara Area.	✓	-	O F	Yalgoo_202 Yalgoo_358 Yalgoo_363 Yalgoo_419 Yalgoo_420
2	Acacia shrubland over granite, and granite outcrops	Acacia open shrubland often over a herbfield of Resurrection Plant (*Borya sphaerocephala*) on shallow sandy loam over granite, with some granite outcropping. The outcrops have a low profile with little actual exposed rock, and are scattered throughout the large area in the south, and just north of the accommodation village. Areas with Acacia shrubland occur in the west of the proposed TSF (around granite outcrops), and just to the north of the accommodation village.	✓	-	B	Yalgoo_358 Yalgoo_364 Yalgoo_419
3	Acacia tall shrubland on moderately deep sandy loam, often with scattered small rock on surface	Acacia tall shrubland on moderately deep sandy loam, often with scattered small rocks on surface. Abundant annuals in winter and spring. Scattered York Gum (*Eucalyptus loxophleba*) and other eucalypts. Extensive and generally low in the landscape. Occurs within the Mine Area and surrounding Combined Proposal DE, and in patches along the remainder of the DE to the west of the Karara Area. In the Wheatbelt Area this VSA is confined to road verges and small remnants and is generally highly degraded due to weed invasion.	✓	✓	A C E H R T Z AA AB HMVT B HMVT C HMVT G	Billeranga_692 Jibberding_419 Mingenew_354 Mingenew_380 Mingenew_420 Nanekine_354 Nanekine_551 Nanekine_684 Perenjori_684 Tathra_254 Tathra_354 Tathra_379 Yalgoo_40 Yalgoo_355 Yalgoo_419 Yalgoo_420 Yarra Yarra_380 Yarra Yarra_631 Yuna_380 Yuna_551

VSA	VSA Name	Description	Mine Area	Wheatbelt Area	Associated VT (Umwelt, 2025a)	Equivalent PEVSA
4	Acacia shrubland with scattered Sand Pine on sandy loam flats	Acacia shrubland with scattered Sand Pine (*Callitris columellaris*) on sandy loam flats. Occurs on broad flats mainly in the Mine Area and surrounding Combined Proposal DE. Also occurs immediately to the west of the Karara Area.	✓	-	D	Jibberding_355 Jibberding_419 Yalgoo_40 Yalgoo_419 Yalgoo_420
5	Mixed shrubland and tall thicket of *Acacia* and *Melaleuca* on clay-loam flats with little understorey	Is fairly extensive within the Mine Area (and surrounding Combined Proposal DE) and is also present in the northern corridor west of the Karara Area, and at Tilley Siding.	✓	-	P Q	Jibberding_419 Yalgoo_202 Yalgoo_40 Yalgoo_419 Yalgoo_420 Yalgoo_434
6	Acacia low shrubland on gravelly-loam rises	Shrubs tend to be low (<1.5 m) and dense. This occurs scattered within the Mine Area and surrounding Combined Proposal DE, and along Yandanooka Pipeline where the northern corridor passes through the Koolanooka Hills.	✓	-	S V W X Y	Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_40 Yalgoo_419
7	York Gum open woodland on clay-loam flats with little understorey	Extensive and low in the landscape. Soils may occasionally be waterlogged. Occurs scattered within the Mine Area and surrounding Combined Proposal DE, as patches immediately west of the Karara Area, and in small and degraded (weed invaded) patches along road verges in the Wheatbelt Area.	✓	✓	G I K HMVT E HMVT F	Jibberding_355 Mingenew_352 Mingenew_354 Yalgoo_326 Yalgoo_355 Yalgoo_358 Yalgoo_363 Yalgoo_364 Yalgoo_419 Yalgoo_420 Yalgoo_936 Yarra Yarra_142 Yarra Yarra_631
8	*Eucalyptus clelandiorum* woodland to forest on calcareous clay loam flats usually close to salt lake systems	Is present only within the Karara area, approximately 300 m north of the boundary of the Mine Area.	-	-	U	Yalgoo_125

VSA	VSA Name	Description	Mine Area	Wheatbelt Area	Associated VT (Umwelt, 2025a)	Equivalent PEVSA
9	Chenopod shrublands and salt lakes, with a large system in the central north of the Mine Area. Also includes areas of clay pans	Occurs in the Combined Proposal DE surrounding the Mine Area, approximately 800 m north of the KIOP MLE new disturbance footprint, but not within the footprint areas themselves. It also occurs where the Yandanooka Pipeline and Borefield Corridor cross salt lakes to the west of the Karara Area, such as Weelhamby Lake and the Salt River, and at Tilley Siding.	-	-	CP J L M N HMVT A	Jibberding_1198 Yalgoo_41 Yalgoo_125 Yalgoo_364 Yarra Yarra_142 Yarra Yarra_631
10	Cleared land	Depending upon the location within the Combined Proposal DE, this VSA consists of either land cleared for mining infrastructure and operations, or cleared paddocks and road verge. Cleared land makes up the majority of the DE to the west of the Karara Area, particular the very narrow corridors which tend to follow existing roads through cleared farmland. Within the Wheatbelt Area this VSA contains occasional isolated trees of York Gum or Jam (*Acacia acuminata*). Within the Karara Area (including the Mine Area) this VSA encompasses the mine itself as well as areas cleared for infrastructure such as buildings, roads/tracks and the air strip.	✓	✓	CL	N/A
11	Creeklines	Narrow and probably ephemeral drainage lines with *Eucalyptus camaldulensis* over sedge, *Hakea preissii, Acacia saligna*, annual herbs and introduced grasses on seasonally waterlogged and even wet clay-loam soils. Occurs only within the boundary of the Wheatbelt Area, in the far west of the Combined Proposal DE.	-	✓	HMVT D	Mingenew_352 Mingenew_354 Yalgoo_936 Yarra Yarra_142
12	Planted Eucalypts	Occurs only in the far west of the Combined Proposal DE, along road verges within the Wheatbelt Area.	-	✓	PL	N/A

Source: Kristancic & Bamford (2025).



Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Fauna Habitat VSAs

- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 10 Cleared Land
- 11 Creeklines
- 12 Planted Eucalypts

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 1

0 1 2 km

Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Major Watercourse

Fauna Habitat VSAs

- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 2

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway
- Major Watercourse

Fauna Habitat VSAs

- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land
- 12 Planted Eucalypts

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 3

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway

Fauna Habitat VSAs

- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land
- 12 Planted Eucalypts

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 4

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Fauna Habitat VSAs

- 1 Breakaways and Rocky Ridges
- 3 Acacia Tall Shrubland
- 7 York Gum Open Woodland
- 10 Cleared Land

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 5

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

Legend

- Combined Proposal Development Envelope
- Main Road
- Minor Road
- Railway
- Major Watercourse

Fauna Habitat VSAs

- 5 Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 6

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

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Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Fauna Habitat VSAs

- 3 Acacia Tall Shrubland
- 5 Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
- 6 Acacia Low Shrubland on Gravelly Rises
- 7 York Gum Open Woodland
- 9 Chenopod Shrubland/Salt Lakes/Clay Pans
- 10 Cleared Land

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

FIGURE 3.1
Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 7

0 1 2 km
Scale 1:50,000 at A4
GDA2020 MGA Zone 50

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MUNGADA RD

WEELHAMBY LAKE

Legend

- Combined Proposal Development Envelope
- Minor Road
- Major Watercourse

Fauna Habitat VSAs

1	Breakaways and Rocky Ridges
3	Acacia Tall Shrubland
4	Acacia Shrubland with Sand Pine
5	Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
6	Acacia Low Shrubland on Gravelly Rises
7	York Gum Open Woodland
9	Chenopod Shrubland/Salt Lakes/Clay Pans
10	Cleared Land
Water	Water

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

FIGURE 3.1

Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 8

0 1 2 km

Scale 1:80,000 at A4

GDA2020 MGA Zone 50

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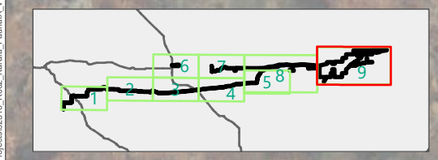

MUNGADA RD

Legend

- Combined Proposal Development Envelope
- Minor Road

Fauna Habitat VSAs

1. Breakaways and Rocky Ridges
2. Acacia Shrubland over Granite
3. Acacia Tall Shrubland
4. Acacia Shrubland with Sand Pine
5. Mixed Acacia and Tall Thicket (Acacia and Melaleuca)
6. Acacia Low Shrubland on Gravelly Rises
7. York Gum Open Woodland
8. *Eucalyptus clelandiorum* Woodland/Forest
9. Chenopod Shrubland/Salt Lakes/Clay Pans
10. Cleared Land

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

FIGURE 3.1

Fauna Habitat VSAs of the Combined Proposal Development Envelope – Sheet 9

0 1 2 km

Scale 1:80,000 at A4

GDA2020 MGA Zone 50

3.2 Terrestrial Fauna

3.2.1 Vertebrate Fauna Assemblage

The desktop review undertaken for the BCE 2025 assessment identified 414 vertebrate fauna species that have the potential to be present within the Combined Proposal DE (Kristancic & Bamford, 2025). These species were then assigned to an expected occurrence category in the Mine Area and Wheatbelt Area of the KIOP MLE new disturbance footprint based on a combination of survey results from the area (including those presented in **Table 2.1**) and the known biology and distribution of the species (from the general literature and BCE professional experience). The occurrence categories used were as defined below:

- **Resident:** Species with a population permanently present in the Mine Area/Wheatbelt Area.
- **Regular Visitor:** Species that regularly occur within the Mine Area/Wheatbelt Area in at least moderate numbers, such as part of an annual cycle.
- **Irregular Visitor:** Species that occur within the Mine Area/Wheatbelt Area irregularly, such as nomadic and irruptive species. The length of time between visitations could be decades, but when the species is present, it uses the Mine Area/Wheatbelt Area in at least moderate numbers and for some time.
- **Vagrant:** Species that occur within the Mine Area/Wheatbelt Area unpredictably, in small numbers and / or for very brief periods. Therefore, the KIOP MLE new disturbance footprint is unlikely to be of importance to the species.
- **Locally Extinct:** Species that would have been present but have not been recently recorded in the local area, and therefore are almost certainly no longer present in the Mine Area/Wheatbelt Area.

Of the 414 species returned from the desktop assessment, 150 and 36 species were considered Resident or Regular Visitor within the Mine Area, respectively, and 117 and 49 were considered Resident or Regular Visitor within the Wheatbelt Area, respectively.

Note that not all species that have the potential to be present within the Combined Proposal DE and KIOP MLE new disturbance footprint have been recorded in the field, due to factors such as lack of sampling under suitable conditions (such as after summer or autumn rain), or species being cryptic and difficult to find (e.g. reptiles and frogs) (Kristancic & Bamford, 2025). Therefore, applying expected occurrence categories to all species returned by the desktop assessment is considered a more robust approach of predicting fauna assemblages compared to relying on (potentially incomplete) species occurrence records.

3.2.2 Significant Fauna

Of the 414 terrestrial fauna species identified from the desktop assessment (**Section 3.2.1**), 27 species of conservation significance were considered Resident or Regular Visitor within the Mine Area, and 13 within the Wheatbelt Area (Kristancic & Bamford, 2025). Conservation significance categories were assigned by Kristancic & Bamford (2025) using the following definitions:

- **Conservation Significance (CS) 1:** Species that are listed under the WA *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- **Conservation Significance 2:** Species that are listed as Priority (P) by DBCA but are not listed under the BC Act or EPBC Act.
- **Conservation Significance 3:** Species that are not listed under Acts or in publications, but considered by BCE to be of at least local significance due to their pattern of distribution.

The conservation significant fauna of the KIOP MLE new disturbance footprint are presented in **Table 3.2** along with their expected occurrence status. The suite of significant fauna predicted to be present within the Mine and Wheatbelt Areas was found by BCE to be very similar, with almost all species expected in to occur at both areas. However, the distribution and occurrence of these species was expected to differ based on the environmental factors such as the extent of clearing, fragmentation, and the surrounding landscape (Kristancic & Bamford, 2025).

A description of each conservation significant fauna species including their distributions, specific habitat requirements and locations recorded by field surveys has not been presented as part of this impact assessment. However, this information as presented by Kristancic & Bamford (2025) has been utilised to inform the potential degree and significance of direct, indirect and cumulative impacts to these species as a result of the KIOP MLE Proposal.

Table 3.2 Conservation Significant Terrestrial Fauna Species and their Expected Occurrence Status in the KIOP MLE New Disturbance Footprint

Scientific Name	Common Name	BCE Conservation Significance	Status (WA)	Status (EPBC)	Mine Area		Wheatbelt Area	
					Expected Occurrence	VSA	Expected Occurrence	VSA
Frogs								
Neobatrachus centralis	Desert Trilling Frog	CS3	-	-	Resident	Throughout except 9	Out of range	NA
Reptiles								
Caimanops (Diporiphora) amphiboluroides	Mulga Dragon	CS3	-	-	Resident	3, 4, 5, 6	Out of range	NA
Morelia spilota	Carpet Python	CS3	-	-	Irregular Visitor	Mainly 1, 2	Irregular Visitor	3, 7, 11
Hesperoedura reticulata	Reticulated Velvet Gecko	CS3	-	-	Resident	7	Resident	7
Cyclodomorphus branchialis	Gilled Slender Blue-tongue	CS1	VU	-	Resident	1, 2	Resident	3, 7, 11
Egernia stokesii badia	Western Spiny-tailed Skink	CS1	VU	EN	Resident	Mostly 7	Resident	Mostly 7
Birds								
Apus pacificus	Fork-tailed Swift	CS1	MI	MI	Irregular Visitor	Throughout	Irregular Visitor	Throughout
Burhinus grallarius	Bush Stone-curlew	CS3	-	-	Regular Visitor	3, 4, 5, 6	Irregular Visitor	Restricted to any remnant vegetation
Cacatua leadbeateri	Major Mitchell's Cockatoo	CS3	-	-	Resident	Forage throughout except bare salt lakes; nesting 7	Irregular Visitor	Forage throughout except bare salt lakes; nesting 7
Zanda latirostris	Carnaby's Black-Cockatoo	CS1	EN	EN	Out of range	NA	Irregular Visitor	Throughout
Thinornis cucullatus	Hooded Plover	CS2	P4	-	Irregular Visitor	9	Irregular Visitor	9
Climacteris affinis	White-browed Treecreeper	CS3	-	-	Resident	6, 7	Vagrant	NA
Climacteris rufus	Rufous Treecreeper	CS3	-	-	Resident	7, 8	Irregular Visitor	7
Falco peregrinus	Peregrine Falcon	CS1	OS		Resident	Forage throughout; nest cliff ledges 1	Regular Visitor	Forage throughout
Leipoa ocellata	Malleefowl	CS1	VU	VU	Resident	Forage throughout; mounds mainly 3, 4, 6	Regular Visitor	Foraging 3, 7, 11
Ardeotis australis	Australian Bustard	CS3	-	-	Irregular Visitor	Throughout	Irregular Visitor	Throughout, including paddocks
Oreoica gutturalis	Crested Bellbird	CS3	-	-	Resident	3, 4, 5, 6	Resident	Any remnant vegetation
Calamanthus montanellus	Western Fieldwren	CS3	-	-	Irregular Visitor	3, 6, 9	Irregular Visitor	3, 9
Pyrrholaemus brunneus	Redthroat	CS3	-	-	Resident	3, 4, 5, 6	Resident	3
Aphelocephala leucopsis	Southern Whiteface	CS1	VU	VU	Resident	Parts of 3, 4, 5, 6, 9	Resident	Parts of 3, 9
Eopsaltria griseogularis	Western Yellow Robin	CS3	-	-	Resident	3, 4, 5, 6	Regular Visitor	3
Pomatostomus superciliosus	White-browed Babbler	CS3	-	-	Resident	3, 4, 5, 6	Resident	3
Polytelis anthopeplus	Regent Parrot	CS3	-	-	Regular visitor	Forage throughout; nesting 7	Regular Visitor	Forage throughout; nesting 7
Neophema splendida	Scarlet-chested Parrot	CS3	-	-	Vagrant	Throughout	Vagrant	Throughout
Actitis hypoleucos	Common Sandpiper	CS1	MI	MI	Irregular Visitor	Salt lakes and margins; 9	Irregular Visitor	Salt lakes and margins; 9
Calidris acuminata	Sharp-tailed Sandpiper	CS1	MI	VU & MI	Irregular Visitor	Salt lakes and margins; 9	Irregular Visitor	Salt lakes and margins; 9
Calidris ferruginea	Curlew Sandpiper	CS1	CR	CR & MI	Irregular Visitor	Salt lakes and margins; 9	Irregular Visitor	Salt lakes and margins; 9
Calidris ruficollis	Red-necked Stint	CS1	MI	MI	Irregular Visitor	Salt lakes and margins; 9	Irregular Visitor	Salt lakes and margins; 9
Calidris subminuta	Long-toed Stint	CS1	MI	MI	Irregular Visitor	Salt lakes and margins; 9	Irregular Visitor	Salt lakes and margins; 9
Tringa nebularia	Common Greenshank	CS1	MI	EN & MI	Irregular Visitor	Salt lakes and margins; 9	Irregular Visitor	Salt lakes and margins; 9

Scientific Name	Common Name	BCE Conservation Significance	Status (WA)	Status (EPBC)	Mine Area		Wheatbelt Area	
					Expected Occurrence	VSA	Expected Occurrence	VSA
Mammals								
Antechinomys (*Sminthopsis*) *longicaudata*	Long-tailed Dunnart	CS2	P4	-	Resident	1, 2	Resident	3, 7, 11
Pseudantechinus woolleyae	Woolley's Pseudantechinus	CS3	-	-	Resident	1, 2	Resident	3, 7, 11
Antechinomys laniger	Kultarr	CS3	-	-	Resident	3, 4, 5, 6	Irregular Visitor	3
Trichosurus vulpecula	Brush-tailed Possum	CS3	-	-	Irregular Visitor	1, 7	Irregular Visitor	7
Nyctophilus major tor	Inland Long-eared Bat	CS2	P4	-	Resident	Forage throughout; shelter 7, 8	Irregular Visitor	Any with occasional large eucalypt
Invertebrates								
Idiosoma clypeatum	Northern Shield-backed Trapdoor Spider	CS2	P3	-	Resident	1, 3, 5, 6	Out of range/locally extinct	NA
Idiosoma formosum	Ornate Trapdoor Spider	CS1	EN	-	Resident	4 and 6; also possibly 5 and 7	Out of range/locally extinct	NA
Aganippe (*Idiosoma*) sp.	Unidentified trapdoor spider	CS3	-	-	Resident	2	Out of range	NA
Antichiropus sp. nov. 'Karara'	Karara Millipede	CS3	-	-	Resident	1, 3	Out of range	NA
Millipede sp. nov. 'PM1'	Millipede PM1	CS3	-	-	Resident	1, 3	Out of range	NA
Urodacus sp. nov. 'Mt Gairdner'	Mt Gairdner Scorpion	CS3	-	-	Resident	1, 3	Out of range	NA

CR: Critically Endangered; EN: Endangered; VU: Vulnerable; MI: Migratory; OS: Species otherwise in need of special protection (other specially protected).

Source: Kristancic & Bamford (2025).

4.0 Potential Impacts

The following sections list activities from the KIOP MLE Proposal that could potentially impact terrestrial fauna values, including directly, indirectly, and cumulatively.

4.1 Direct Impacts

The potential direct impacts to terrestrial fauna from Proposal activities comprise direct habitat loss and loss of terrestrial fauna (including significant fauna species) as a result of clearing of native vegetation. Direct impacts have been assessed based on the KIOP MLE new disturbance footprint, as shown in **Figure 1.2**.

The KIOP MLE new disturbance footprint is 1,522 ha and contains approximately 1,441 ha of vegetation (excluding CCAC areas). This includes 1,429 ha within the Mine Area and 12 ha within the Wheatbelt Area.

4.2 Indirect Impacts

The KIOP MLE Proposal activities and threats that may lead to indirect impacts to fauna or degradation of fauna habitats include:

- Vibration, noise, light and dust impacts.
- Accidental clearing outside of approved areas or driving outside planned disturbance areas, resulting in reduced vegetation condition in proximity to cleared areas, unnecessary or unapproved clearing of fauna habitats.
- Fragmentation and reduced connectivity between fauna habitats.
- Fauna becoming trapped in excavations.
- Vehicle strike.
- Habitat degradation due to weed invasion.
- Increase in the numbers of scavengers and/or non-native fauna, resulting in increased competition for native fauna.
- Seepage from wet TSFs or leaking from pumping of wet tailings resulting in soil and water contamination.
- Spillage of hydrocarbons and other chemicals.

Hydrological modelling for the Combined Proposal has been undertaken by Stantec (2024), which concluded that it would be unlikely that the predicted hydrological changes to the Karara Area would significantly impact surface water or groundwater dependent vegetation. For this reason, hydrological factors such as changes to surface water hydrology and groundwater levels, and any flow-on effects for fauna species, were excluded from the indirect impact assessment.

A potential indirect impact zone was spatially defined as described in **Section 1.2.2** and presented in **Figure 1.4**. This boundary has been prepared to account for any potential indirect impacts as a result of the KIOP MLE Proposal. A quantitative discussion of potential indirect impacts, as well as proposed mitigation measures, is presented in **Section 5.2**.

4.3 Cumulative Impacts

Cumulative impacts to fauna species and habitats could occur as a combination of impacts from the KIOP MLE Proposal as well as historical impacts, including clearing for other historical proposals in the region (as far as they can be assessed). Cumulative impacts within CAA 1 (a 15 km buffer on the Mine Area of the KIOP MLE new disturbance footprint; **Section 7.2.1**) will likely be a result of a combination of impacts from KIOP, MIOP, HIOP, SMC, Warriedar Golden Range and Mt Mulgine projects in the area. Cumulative impacts within CAA 2 (a 15 km buffer on the Wheatbelt Area; **Section 7.2.2**) will be predominately a result of the extensive historical clearing for agricultural activities (principally cereal cropping or grazing) in the Wheatbelt region (DoE, 2015).

5.0 Mitigation

This section describes the mitigation measures that have been applied for the KIOP MLE Proposal to minimise the impact on significant terrestrial fauna species and their habitats.

5.1 Mitigation Hierarchy

The KIOP MLE Proposal has been developed in accordance with the mitigation hierarchy of avoid, minimise, rehabilitate, and offset in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023).

The following measures have been implemented to **avoid** potential impacts (both direct and indirect) to significant terrestrial fauna and their habitats:

- The proposed MLE has been designed to avoid impacts to BIF landforms outside of Mt Karara, and the WRD expansion has been designed to minimise impacts to BIF landforms. This will minimise/localise impacts for species that live in or otherwise utilise rocky environments (e.g. Gilled Slender Blue-tongue and Peregrine Falcon).
- Existing above-ground powerlines will be used, minimising the potential for bird or bat electrocution events.

The following industry standard and best practice measures will be implemented during detailed design, construction, and operations of the KIOP MLE to **minimise** potential impacts to terrestrial fauna:

- The KIOP MLE new disturbance footprint has been designed to minimise direct and indirect impacts to significant fauna habitats where practicable.
- The KIOP MLE new disturbance footprint uses existing disturbed areas where possible, minimising the need for new disturbance.
- Pre-inspection of the proposed clearing area will be conducted prior to ground disturbance activities commencing in line with KML's internal *Environmental Procedure – Approvals Request and Ground Disturbance* (Document Number CORP-EN-PRO-1004. Fauna and/or its habitat will be relocated if required. If there will be impacts to Malleefowl nesting habitat, active Malleefowl mounds shall be avoided where possible and inspections will be undertaken to determine the status of the mound(s) and if they contain eggs (specific management measures for Malleefowl discussed further in **Section 5.3.1**). If any Western Spiny-tailed Skink and/or any inhabited sites are identified within the proposed clearing area, translocation will be undertaken in line with KML's internal *Environmental Procedure – Western Spiny-tailed Skink Management, Monitoring and Translocation* (Document Number CORP-EN-PRO-1024) (specific management measure for Western Spiny-tailed Skink discussed further in **Section 5.3.2**).
- Lighting will be designed to minimise light spill where feasible in accordance with the *Position Statement: Dark sky and astrotourism* (DPLH, 2022) and industry best practice, minimising potential nocturnal light impacts to fauna.

- KML's internal land disturbance procedure (*Environmental Procedure – Approvals Request and Ground Disturbance*; Document Number CORP-EN-PRO-1004) will be implemented to minimise the risk of unplanned, unnecessary, or unauthorised clearing, following standard industry practice. Key management measures to be implemented include:
    - A Ground Disturbance Permit will be obtained from the KML Environment Department before commencing any activities that will change or disturb the ground surface or vegetation.
    - Each application for a Ground Disturbance Permit will be assessed by the Environment Department who will assess the application against aspects such as heritage, flora, fauna and legislative approvals / requirements.
    - The Ground Disturbance Permit may be granted subject to conditions including conditions to avoid disturbance to fauna species of conservation significance. The conditions will be tracked to completion.
    - Areas required to be cleared will be surveyed and clearly demarcated, and clearing activities will be supervised to prevent over-clearing.
    - Ground Disturbance activities will be subject to assessments and inspections, both pre and post clearing.
- Water storage facilities will be fenced and access to pit lakes will be restricted to minimise the risk of access by terrestrial fauna and subsequent health impacts or potential death by drowning. Fauna egress points will also be installed at wet TSFs and water storage facilities as required.
- Excavations will be inspected and any vertebrate fauna in the excavation shall be relocated prior to closing the excavation. If excavations remain open overnight, they will be checked for fauna in the morning before recommencing activity, and fauna relocated if required.
- Strict speed limits (20 km/hr at the plant site and 60 km/hr on haul roads and public roads (e.g. Mungada Road, Karara Road)) will be enforced to mitigate the potential of fauna strikes. Any mortalities from fauna strikes will be recorded on KML's Fauna Register, including relevant details of the incident where available, to adaptively manage vehicle use and minimise future fauna strikes.
- Workforce inductions and toolbox training will include information on significant terrestrial fauna and controls to mitigate risks.
- Chemicals and hydrocarbons will be appropriately stored, bunded and handled, and spills will be immediately controlled, contained and cleaned up.
- Hot works will be undertaken in suitable locations, away from vegetation and in accordance with industry best practice.
- Records of significant fauna mortalities, injuries and translocations shall be kept on KML's Fauna Register and reported in KML's incidents management system (e.g. INX In-Control) so any issues can be identified and addressed, to minimise the risk of repeated impacts to significant terrestrial fauna.

The following measures will be implemented to **rehabilitate** fauna habitat impacted by the Proposal:

- A mine closure plan will be developed for the KIOP MLE Proposal in accordance with relevant Department of Mines, Petroleum and Exploration (DMPE) and EPA guidance, and include closure objectives and completion criteria for terrestrial fauna and post-closure land use determined in consultation with relevant stakeholders.
- Disturbed areas will be progressively rehabilitated during operations where practicable. Active operational areas will be rehabilitated at the end of mine life.

Mitigation measures during preliminary design have focused on eliminating the direct impacts of the KIOP MLE Proposal. Further mitigation measures will be applied during detailed design, construction, and operations to reduce likelihood of indirect impacts. Rehabilitation and closure planning will include objectives for re-establishment of fauna habitat determined in consultation with relevant stakeholders.

5.2 Indirect Impacts Mitigation Measures

Measures that may mitigate the potential indirect impacts identified in **Section 4.2** are presented in **Table 5.1**. This assessment has focussed on fauna species that are listed under the BC Act or EPBC Act or have been assigned a conservation category code by DBCA, and are expected to be Residents or Regular Visitors of the KIOP MLE new disturbance footprint (**Section 3.2.2**).

Table 5.1 Assessment of Indirect Impacts to Listed Significant Terrestrial Fauna from the KIOP MLE Proposal

Proposal Activity	Threat	Potential Indirect Impact	Assessment of Risk of Impact				Significant Species at Highest Risk of Impact	Proposed Mitigation Measures
			Birds	Reptiles	Mammals	Invertebrates		
Establishment of infrastructure	• Fragmentation. • Reduced connectivity between fauna habitats. • Isolation of restricted fauna habitats.	• Interruption to fauna behaviours (migration, foraging, breeding, nesting, etc.). • Increased exposure to predators due to loss of vegetation cover. • Unauthorised clearing resulting in direct reductions in habitat.	**Potentially at Risk** • Predation of land-based birds such as Malleefowl may result in the loss of individuals. The loss of even a small number of individuals can have a major impact on the local population. • Southern Whiteface distribution is heavily influenced by vegetation structure, and changes may reduce available habitat for this species locally. However, abundant suitable habitat will remain in the local area. They are not restricted to any VSA due to their aerial nature. • The KIOP MLE Proposal area does not contain suitable nesting habitat for Peregrine Falcon (Kristancic & Bamford, 2025) and any reductions in foraging habitat are unlikely to be significant given their aerial nature and abundant habitat remaining within the vicinity. • The remaining Resident or Regular Visitor generally utilise a number of VSAs and therefore there is likely other suitable habitat in the vicinity. They are not restricted to any VSA due to their aerial nature.	**At Risk** • Predation of WSTS is expected to occur where vegetation cover is removed, resulting in declining local abundance of colony sites. • Gilled Slender Blue-tongue appears to be restricted to rocky landscapes across the Karara Area, which includes parts of the Mine Area. Removal of such habitat may result in fragmentation of habitat and dispersal areas.	**At Risk** • Fragmentation and removal of vegetation (trees with hollows and loose bark, shrubs) may result in a reduction in the use of the Combined Proposal DE by Inland Long-Eared Bat, particularly within the Wheatbelt Area (although has been categorised as an Irregular Visitor within the Wheatbelt Area). • Removal of rocky areas from the Mine Area may also result in some fragmentation to habitat for Long-tailed Dunnart	**Unlikely to be at Risk** • Northern Shield-backed Trapdoor Spider and Ornate Trapdoor Spider are unlikely to experience fragmentation due to extensive suitable habitat remaining in the region beyond the Combined Proposal DE (Kristancic & Bamford, 2025). • A lack of data on habitat preferences for the unidentified trapdoor spider make assessment of the risk of fragmentation difficult. However the location of direct impact to VSA 2 is unlikely to result in fragment of this habitat.	• Malleefowl • WSTS • Gilled Slender Blue-tongue • Inland Long-eared Bat • Long-tailed Dunnart	• Infrastructure will be established as far away as practicable from known significant fauna locations and habitat. • The KIOP MLE new disturbance footprint will utilise existing disturbed areas where practicable, minimising new disturbance. • Internal land disturbance procedure will be implemented to minimise the risk of unauthorised clearing of fauna habitats.

Proposal Activity	Threat	Potential Indirect Impact	Assessment of Risk of Impact				Significant Species at Highest Risk of Impact	Proposed Mitigation Measures
			Birds	Reptiles	Mammals	Invertebrates		
	• Excavations during construction.	• Small terrestrial fauna may become trapped in excavations and may die due to stress, exhaustion, heat exposure or flooding.	**Not at Risk** • Malleefowl are likely to be able to escape excavations. • Aerial bird species are not at risk.	**At Risk** • Reptiles are unlikely to be able to escape excavations.	**Potentially at Risk** • Long-tailed Dunnart would be unlikely to escape larger excavations. • Inland Long-Eared Bat is unlikely to be at risk.	**Unlikely to be at Risk** • Spiders are likely to be able to escape excavations.	• WSTS • Gilled Slender Blue-tongue • Long-tailed Dunnart	• Excavations will be inspected and any vertebrate fauna relocated prior to fill in. • If excavations remain open overnight, they will be checked for fauna in the morning before recommencing activity, and fauna relocated if required.
Vehicle movements on roads	• Vehicle strike.	• Loss of fauna individuals.	**At Risk** • Land-based Malleefowl are at risk, particularly as they tend to freeze when disturbed. • The risk to aerial bird species is negligible.	**At Risk** • Slow moving reptiles may be at risk, particularly when using roads as a heat source for thermoregulation.	**At Risk** • Mammals are at risk. Vehicle use, including heavy vehicles, will occur day and night.	**Unlikely to be at Risk** • Trapdoor spiders predominately reside underground and are unlikely to be at risk.	• Multiple species	• Speed limits will be enforced. Speed limits within the plant site will be restricted to 20 km/hr, and on haul roads and public roads to 60 km/hr. • Inductions and education programmes will cover the importance of speed limits for the mitigation of impacts to terrestrial fauna. • Injuries or deaths of significant fauna species will be recorded, and further management actions identified as required.
Above ground power lines	• Bird or bat strike and electrocution.	• Loss of fauna individuals.	**At Risk** • Bird may come into direct contact with power lines, particularly birds of prey. • Peregrine Falcon may come into direct contact with power lines given its use of a wide range of environments including high artificial structures.	**Not at Risk** • Power lines are outside of their activity ranges.	**At Risk** • Inland Long-Eared Bat may be at risk given its use of a wide range of environments.	**Not at Risk** • Power lines are outside of their activity ranges.	• Peregrine Falcon • Inland Long-Eared Bat	• The use and length of powerlines will be minimised as far as practicable.
Water and wet tailings storage facilities, pit lakes, ponds and dams	• Potentially environmentally hazardous materials leaching into surrounding environment. • Fauna attracted to water with no or minimal escape routes.	• Impacts to fauna and fauna habitat health from hazardous materials, resulting in illness or death. • Loss of individuals from drowning or exhaustion.	**At Risk** • Birds may access these facilities and suffer health effects or be unable to escape.	**Not at Risk** • Reptiles are not expected to access these facilities.	**At Risk** • Inland Long-Eared Bat may access these facilities and suffer health effects or be unable to escape. • Long-tailed Dunnart unlikely to be at risk as they get enough hydration from their diets and do not need to drink.	**Not at Risk** • Trapdoor spiders are not expected to access these facilities.	• Southern Whiteface • Inland Long-Eared Bat	• Water storage facilities will be fenced. • Access to pit lakes will be restricted. • Fauna egress points will be installed. • Injuries or deaths of significant fauna species will be recorded, and further management actions identified as required.

Proposal Activity	Threat	Potential Indirect Impact	Assessment of Risk of Impact				Significant Species at Highest Risk of Impact	Proposed Mitigation Measures
			Birds	Reptiles	Mammals	Invertebrates		
Pumping of tailings and storage of tailings in the TSF	• Pipeline leak or failure. • Overtopping or failure of TSF.	• Contamination of water sources leading to health impacts to fauna.	**At Risk** • Water source with elevated metal concentration or acidity might be consumed by birds, leading to health risk.	**At Risk** • Water source with elevated metal concentration or acidity might be consumed by reptiles, leading to health risk.	**At Risk** • Water source with elevated metal concentration or acidity might be consumed by Inland Long-Eared Bat, leading to health risk. • Long-tailed Dunnart unlikely to be at risk as they do not drink water.	**Unlikely to be at Risk** • Trapdoor spiders predominately reside underground and are unlikely to be at risk.	• Multiple species	• Pipeline design will include bunding or secondary containment. • Pipelines will include automatic failure detection or will be regularly inspected. • Low permeability lining will be used at the TSF to minimise seepage, informed by geochemical characterisation and risk assessment. • TSF operations manual to be developed with operational management and monitoring requirements in line with regulatory requirements. • TSF design, construction and operation will be regulated by DMPE and DWER.
General construction and operations	• Vibration, noise and light impacts.	• Degradation or reduced suitability of fauna habitat in proximity to operational areas and roads. • Displacement of fauna away from KIOP MLE Proposal area towards habitats that are potentially less suitable.	**Unlikely to be at Risk** • Majority of species have a large activity range and there is abundant suitable habitat in the vicinity of the KIOP MLE Proposal area to support their populations. They would be expected to remove themselves from the area if impacted.	**At Risk** • Light, vibration and noise may impact activities such as foraging and breeding.	**At Risk** • Light impacts may disrupt Inland Long-eared Bat and Long-tailed Dunnart which are nocturnal species. • Lights may attract insects and thus attract Inland Long-eared Bat and Long-tailed Dunnart which are insectivores, placing them at greater risk of other impacts such as vehicle strike.	**Unlikely to be at Risk** • Trapdoor spiders predominately reside underground and are unlikely to be at risk.	• WSTS • Gilled Slender Blue-tongue • Inland Long-eared Bat • Long-tailed Dunnart	• Compliance with industry requirements for noise and light emissions. • Mine equipment will be selected and maintained to minimise noise emissions as far as practicable. • The KIOP MLE new disturbance footprint has been located in proximity to existing disturbed areas where practicable.

Proposal Activity	Threat	Potential Indirect Impact	Assessment of Risk of Impact				Significant Species at Highest Risk of Impact	Proposed Mitigation Measures
			Birds	Reptiles	Mammals	Invertebrates		
Putrescible landfill	• Increase in the numbers of scavengers and/or non-native fauna.	• Adverse impacts to trophic links, such as increased competition or predation. • Landfill may support and act as a source of predators in the local area, helping them maintain a presence in otherwise more marginal habitat, and resulting in an increase in predation risk in the local area.	**At Risk** • Malleefowl unlikely to utilise these facilities, however may be indirectly impacted if in proximity to landfills where predators (cats, foxes) are potentially present in higher abundance. • Other birds species may be attracted to the landfill, and putrescible waste may be consumed, leading to health effects. • General increased risk of predation, e.g. from foxes or feral cats, if local population numbers increase.	**At Risk** • WSTS and Gilled Slender Blue-tongue at risk of predation by corvids and cats, either while access landfills, or if in proximity to landfills where corvids/cats are potentially present in higher abundance.	**At Risk** • Long-tailed Dunnart unlikely to utilise these facilities, however may be indirectly impacted if in proximity to landfills where predators (cats, foxes) are potentially present in higher abundance.	**Unlikely to be at Risk** • Trapdoor spiders are not expected to access these facilities or be indirectly affected.	• Multiple species	• Putrescible waste will be managed in accordance with 'Environmental Protection (Rural landfill) Regulations 2002', or DWER licence conditions. • The existing landfill will be utilised to concentrate potential impacts to one area. • The landfill boundary has exclusionary fencing and gates to prevent movement of predators such as cats and foxes. The fences and gates are maintained regularly.
Handling, storage and use of chemicals and hydrocarbons	• Accidental discharge of chemicals and hydrocarbons to the environment.	• Degradation of fauna habitat. • Contamination of water sources leading to health impacts in fauna.	**At Risk** • Contaminated water might be consumed by birds, leading to health risk.	**At Risk** • Contaminated water might be consumed by reptiles, leading to health risk.	**At Risk** • Contaminated water might be consumed by Inland Long-Eared Bat, leading to health risk. • Long-tailed Dunnart unlikely to be at risk as they do not drink water.	**Unlikely to be at Risk** • Trapdoor spiders predominately reside underground and are unlikely to be at risk.	• Multiple species	• Storing and handling hydrocarbons and chemicals in accordance with *Water Quality Protection Guidelines for Mining and Mineral Processing – above-ground fuel and chemical storage* (Water and River Commission, 2000). • Hydrocarbons and chemicals will be appropriately stored in sealed and bunded areas. • Spill kits will be readily available at the mine site and chemical/hydrocarbon storage areas, and will be regularly checked and serviced. • Spilled hydrocarbons and chemicals will be immediately controlled, contained and cleaned up. • Hydrocarbon and chemical waste will be appropriately stored and removed from site to an approved landfill facility.

Proposal Activity	Threat	Potential Indirect Impact	Assessment of Risk of Impact				Significant Species at Highest Risk of Impact	Proposed Mitigation Measures
			Birds	Reptiles	Mammals	Invertebrates		
Hot works	• Changes to fire regime, increased risk of causing a fire that could spread to native vegetation.	• Loss of fauna habitat or individuals in the event of a fire.	**At Risk** • Bird individuals and habitat may be impacted by fire.	**At Risk** • Reptile individuals/ colonies and habitat may be impacted by fire.	**At Risk** • Mammal individuals and habitat may be impacted by fire.	**At Risk** • Spider individuals and habitat may be impacted by fire.	• Multiple species	• Hot work permits must be obtained prior to undertaking hot works. • Hot works area must be inspected prior to work commencement to ensure no vegetation is in the vicinity of the working area. • Flammable/combustible liquids and solids will be removed or be at least 10 m away from the hot works area. • Firefighting equipment will be accessible in the hot works area and will be regularly inspected. • Hot works will not be conducted within close proximity to significant fauna habitats where practicable.

5.3 Management Measures

KML will manage potential impacts to fauna in accordance with existing KML management system documents, including the *Fauna Management Plan* (Document Number CORP-EN-PLN-1008) and the *Environmental Procedure – Terrestrial Fauna Management* (Document Number CORP-EN-PRO-1010), as well as species-specific procedures outlined in the below sections for Malleefowl and Western Spiny-tailed Skink (WSTS). Adaptive management measures have been included in the Malleefowl and Western Spiny-tailed Skink management procedures.

Any fauna deaths will be reported using the *Fauna Sighting and Mortality Form* (Document Number CORP-EN-FRM-1045) and recorded on KML's Fauna Register which includes key information to assist KML determine the appropriate management measures to reduce fauna mortality incidents (for example, additional road signage, reducing speed limits) over time.

5.3.1 Malleefowl

KML will manage the KIOP MLE Proposal in accordance with KML's *Environmental Procedure – Malleefowl Management and Monitoring* (Document Number CORP-EN-PRO-1035; provided in **Appendix A**), which has been reviewed and endorsed by DBCA and DCCEEW. Many of these mitigation measures reflect the recovery actions identified in the *National Recovery Plan for the Malleefowl* (DCCEEW, 2024a).

Key management measures that will be implemented for this species include:

- Active Malleefowl mounds shall be avoided, and active mounds located inside or within 10 m of a proposed clearing boundary will be marked for avoidance.
- If Malleefowl mounds are identified during the ground disturbance desktop review process, additional inspections will be undertaken to determine the status of the mound(s) and if they contain eggs as part of the KML Pre-Ground Disturbance Inspection.
- Where active Malleefowl mounds exist in areas of proposed disturbance, clearing will be taken outside of breeding season (1 September to 30 April) where practicable.
- If a mound does contain eggs, then the work must be postponed until the eggs are no longer incubating or the eggs have been removed.
- Where active mounds cannot be avoided, KML will contact DBCA to coordinate mound excavation and appropriate collection, incubation and transport of chicks and eggs.
- KML will maintain a record of all sightings of Malleefowl and / or Malleefowl mounds.
- KML will continue to undertake annual Malleefowl mound monitoring. This monitoring is undertaken during the breeding season in accordance with the National Malleefowl Monitoring Manual (NMRT, 2020). The results are provided to DBCA, DCCEEW and Department of Water and Environmental Regulation (DWER) in annual reports.

The above management measures for Malleefowl are currently implemented at KIOP. Approximately 916 mounds of varying status (ancient through to fresh and actively used) have been identified and surveyed since 2008. The percentage of active mounds ranged from 2% (in 2012) to 27% (in 2022) and an average activity of 10% has been recorded over the past 16 years. The total number of mounds monitored in any one year has varied since the commencement of monitoring (ranging from 63 to 298); however, the total number of active mounds identified each year has remained relatively consistent, ranging from 7 to 19 over the past 8 years, with an average of 11 active mounds identified per year in the last 16 years. There have been a total of 722 Malleefowl sightings since 2010 (9 in 2024; 24 in 2023; 21 in 2022; 13 in 2021; 23 in 2020).

A spatial analysis of monitoring data shows that Malleefowl have occupied various mounds within operational areas where impacts to Malleefowl activity may be anticipated, with many sites being used for multiple years over the reporting period. This may suggest that Malleefowl are relatively undisturbed by proximity to mining activity.

Recorded Malleefowl mortalities include:

- 1 Malleefowl mortality as a result of a dog attack in 2023.
- 6 Malleefowl mortalities due to vehicle strike as a result of KMG operations on the shared Mungada Road (2023-2024).

5.3.2 Western Spiny-tailed Skink

KML will manage the KIOP MLE Proposal in accordance with KML's *Environmental Procedure – Western Spiny-tailed Skink, Management, Monitoring and Translocation* (Document Number CORP-EN-PRO-1024; provided in **Appendix B**), which has been reviewed and endorsed by Department of Agriculture, Water and the Environment (DAWE; now DCCEEW) and DWER.

Key management measures that will be implemented for this species include:

- Ground truthing of the proposed clearing area is conducted prior to ground disturbance activities commencing to ensure no inhabited logs are impacted.
- Where infrastructure and roads are constructed, large trees and logs will be retained within the disturbance area to resemble Western Spiny-tailed Skink habitat and encourage the return of the species to the area. The retention of potentially suitable logs for skinks within the disturbance area supports the nature of the species to maintain discreet family groups and home ranges (DEC, 2012).
- Re-created habitat shall be located in areas with understorey vegetation, at least 5 m from the edge of the disturbed areas.
- In instances where Western Spiny-tailed Skink colonies or habitats cannot be avoided, they will be translocated. KML will obtain a licence to take fauna through DBCA in order to carry out the handling of Western Spiny-tailed Skink during any translocation process.

- KML shall monitor known control, impact, translocation and surveyed Western Spiny-tailed Skink sites within and beyond the Combined Proposal DE annually during spring or early summer (when Western Spiny-tailed Skink are known to be more active). The objectives of the monitoring are to detect impacts from disturbance associated with mining, detect impacts from changed management such as feral species control, and examine the effectiveness of translocations. The monitoring of translocated individuals is in line with one of the recovery actions of the *Western Spiny-tailed Skink (Egernia stokesii) National Recovery Plan* (DEC, 2012).
- Any information on the number of Western Spiny-tailed Skink and / or colonies that are translocated, injured or killed and any occurrences of unauthorised disturbance to Western Spiny-tailed Skink sites shall be included in KML's Annual Environmental Report.

The above management measures for Western Spiny-tailed Skink are currently implemented at KIOP. KML's objective of undertaking annual monitoring for the presence or absence of Western Spiny-tailed Skink has been achieved in each successive year since the commencement of monitoring in spring 2011. Monitoring results to date suggest that mining-related activities are not impacting Western Spiny-tailed Skink populations. Whilst presence/absence data varies between years, skink activity at impact and control sites are closely aligned.

One Western Spiny-tailed Skink mortality has been recorded since monitoring commenced (in 2018).

6.0 Impact Assessment Methods

The assessment of impacts to significant fauna was determined through spatial analysis in a GIS environment by quantification of the KIOP MLE new disturbance footprint (direct/indirect impacts) or proposed Combined Proposal DF (cumulative impacts) on fauna habitats in the Combined Proposal DE and surrounding area. The KIOP MLE Proposal is expected to directly impact no more than 1,522 ha (which comprises 1,441 ha of vegetation).

6.1 Direct Impacts to Fauna Habitats

Spatial layers of the areas defined in **Section 1.2.1** were overlain on VSA mapping (as derived from VT mapping prepared by Umwelt (2025a)) in a GIS environment to determine the potential extent of direct impact to VSAs and thus significant fauna species habitat. Any areas mapped within CCAC areas (defined in **Section 1.2** and presented in **Figure 6.1**) were discounted during the assessment, and consequently direct impact to VSAs was calculated as the remaining extents of the portions of the KIOP MLE new disturbance footprint that are not CCAC areas.

6.2 Indirect Impacts to Fauna Habitats

A spatial layer representing a buffer of 50 m on the Mine Area (excluding several minor isolated portions) and 10 m around all other proposed infrastructure was generated to assess the potential indirect impact of the KIOP MLE Proposal (**Section 1.2.2**). This indirect impact zone was used in a GIS spatial environment to quantify potential indirect impacts (i.e. edge effects) of the KIOP MLE Proposal on nearby significant fauna and fauna habitats.

The indirect impact assessment is based on a worst-case scenario, assuming total clearing of the Combined Proposal DF and total loss / deterioration of fauna habitats within the indirect impact zone. However, actual total loss of habitat within this zone is considered unlikely based on observations of vegetation condition bordering the existing operations at KIOP.

6.3 Cumulative Impacts to Fauna Habitat

The cumulative impact assessments considered areas that would be potentially directly impacted by the Combined Proposal DF, in addition to impacts (both existing and previously approved) from CCAC land (where data was available). Impacts to DPIRD (2019) PEVSAs were quantified to capture the total previous and potential loss of fauna habitat within CAA 1 and CAA 2 (represented by 15 km buffers on the Mine Area and Wheatbelt Area, respectively).

Historical clearing that was included in the cumulative direct impact assessment for CAA 1 comprised:

- CCAC areas as listed in **Section 1.2**.
- Approved disturbance footprints for HIOP (MS 968) and neighbouring SMC operations (Mungada East, MS 1071 and Koolanooka/Blue Hills DSO Project, MS 811).

- Land mapped as cleared by Woodman Environmental (2012), provided the area was still visibly cleared based on current Esri (2025) satellite imagery.
- Large (visible at approximately 1:100,000 scale) areas of disturbance from the Warriedar Golden Range and Mt Mulgine Projects, manually mapped by Umwelt using current satellite imagery (Esri, 2025).

For CAA 2, native vegetation extent mapping from DPIRD (2025) (last updated June 2023), along with CCAC areas, were overlain on PEVSAs in a GIS environment to estimate the total existing and potential direct impacts to PEVSAs.

Note that the DPIRD (2025) native vegetation extent spatial dataset was not used when mapping historically cleared areas within CAA 1 (as was done for CAA 2) because this dataset mapped the entire CAA 1 area as native remnant vegetation except for some parts of the existing KIOP. Therefore, the approach described above for determining historically cleared areas within CAA 1 is considered more accurate.

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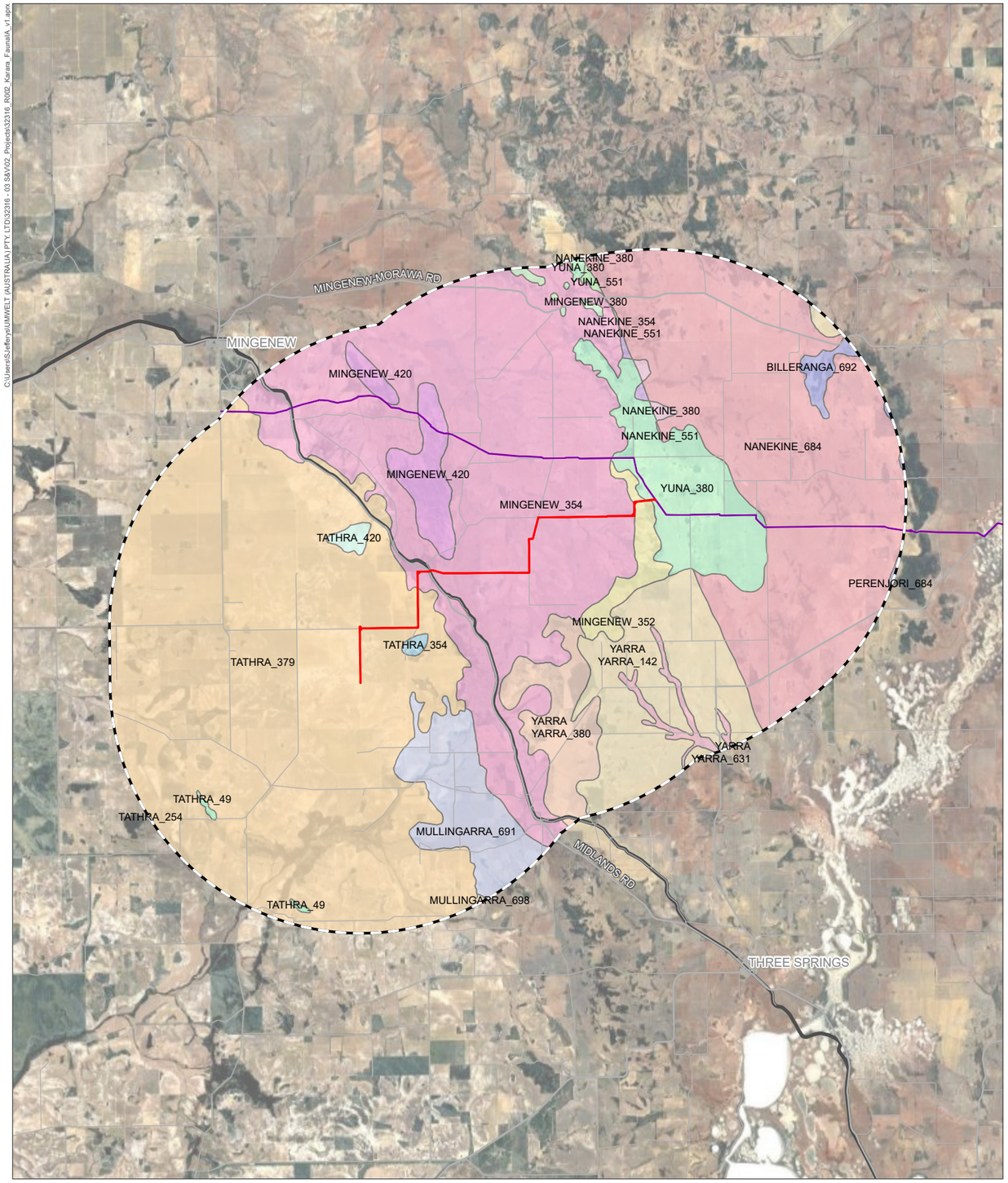

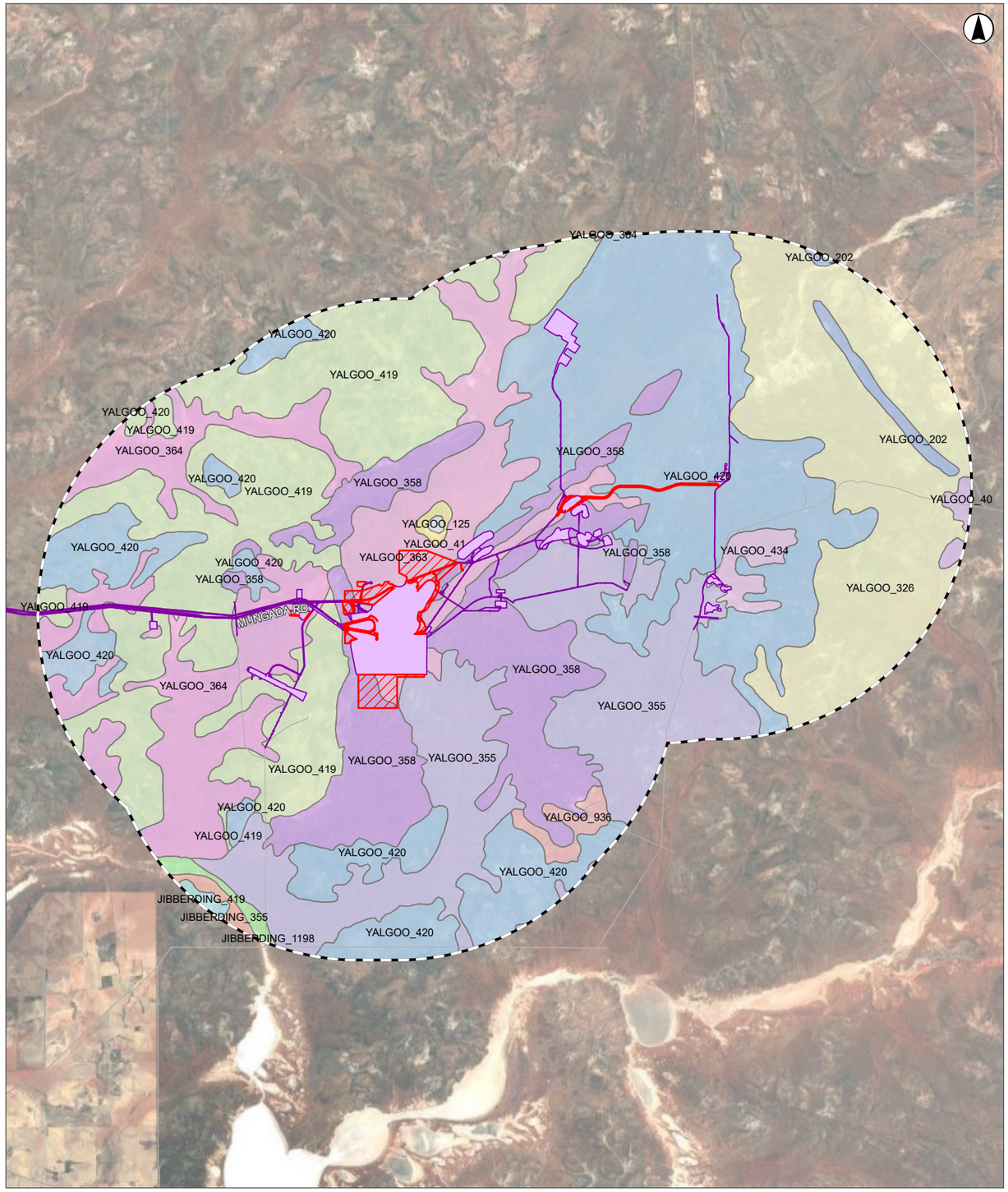

Legend

- Cumulative Assessment Areas
- KIOP MLE New Disturbance Footprint
- Currently Cleared or Approved to be Cleared (CCAC) Areas
- Main Road
- Minor Road
- Railway

Vegetation System Associations

- BILLERANGA_692
- JIBBERDING_355
- JIBBERDING_419
- JIBBERDING_1198
- MINGENEW_352
- MINGENEW_354
- MINGENEW_380
- MINGENEW_420
- MULLINGARRA_691
- MULLINGARRA_698
- NANEKINE_354
- NANEKINE_380
- NANEKINE_551
- NANEKINE_684
- PERENJORI_684
- TATHRA_49
- TATHRA_254
- TATHRA_354
- TATHRA_379
- TATHRA_420
- YALGOO_40
- YALGOO_41
- YALGOO_125
- YALGOO_202
- YALGOO_326
- YALGOO_355
- YALGOO_358
- YALGOO_363
- YALGOO_364
- YALGOO_419
- YALGOO_420
- YALGOO_434
- YALGOO_936
- YARRA YARRA_142
- YARRA YARRA_380
- YARRA YARRA_631
- YUNA_380
- YUNA_551

Image Source: ESRI Basemap (2025) | **Data Source:** SLIP (2025), KML (2025), Umwelt (2025)

FIGURE 6.1
Cumulative Impact Assessment Areas

0 6 12 km

Scale 1:300,000 at A4
GDA2020 MGA Zone 50

7.0 Assessment of Residual Impacts

The KIOP MLE Proposal would result in direct loss of a maximum 1,441 ha of vegetation, and thus fauna habitat, due to proposed land disturbance. Direct impacts have been assessed based on the KIOP MLE new disturbance footprint. Indirect impacts have been assessed as described in **Section 1.2.2**. According to this approach, approximately 171 ha of vegetation may be indirectly impacted by the KIOP MLE Proposal.

The assessment of impacts focuses on potential impacts from the KIOP MLE Proposal on Resident or Regular Visitor significant fauna species only (**Section 3.2.2**), as species that are vagrants or irregular visitors are very unlikely to have a population reliant on the KIOP MLE new disturbance footprint. The assessment quantifies the below impacts on significant fauna habitats that may occur following mitigation measures as described in **Section 5.0**:

- Direct and indirect impacts on fauna habitats (**Section 7.1**).
- Cumulative impacts on fauna habitats (**Section 7.2**).

The results of the assessment of residual impacts from the KIOP MLE Proposal have been assessed qualitatively in **Section 8.0** to determine their potential significance.

7.1 Direct and Indirect Impacts to Fauna Habitats

The potential local direct and indirect impact to habitat for Resident and Regular Visitor significant fauna species is presented quantitatively in **Table 7.1**.

Excluding CCAC areas, the KIOP MLE Proposal will result in local direct impact to 1,441 ha of vegetation and indirect impact to 171 ha of vegetation. This will result in direct and indirect impact to the habitat of all assessed significant fauna species (**Table 7.1**). For Malleefowl, the local impacts were calculated as the sum of impacts to nesting habitat in the Mine Area, and to foraging habitat in the Wheatbelt Area (as the species is not anticipated to nest within the Wheatbelt Area part of the KIOP MLE new disturbance footprint).

The KIOP MLE Proposal will result in local direct and indirect impact to:

- >20.0% of the total habitat for Western Spiny-tailed Skink (WA: VU; EPBC: EN) and White-browed Treecreeper (CS3) within the Combined Proposal DE and indirect impact zone (excluding CCAC areas).
- 19.6% of the total habitat for Reticulated Velvet Gecko (CS3) and Rufous Treecreeper (CS3).
- 15% to 18% of the total habitat for 21 species, including:
    - Ornate Trapdoor Spider (WA: EN): 17.5%.
    - Gilled Slender Blue-tongue (WA: VU): 17.3%.
    - Long-tailed Dunnart (WA: P4): 17.3%.
    - Inland Long-eared Bat (WA: P4): 16.7%.
    - Southern Whiteface (WA: VU; EPBC: VU): 16.3%.

- Peregrine Falcon (WA: OS): 16.1%.
- Northern Shield-backed Trapdoor Spider (WA: P3): 15.4%.

- 14.2% of the habitat for Malleefowl (WA: VU; EPBC: VU) (nesting habitat in the Mine Area, and foraging habitat in the Wheatbelt Area).
- 8.4% of the total habitat for the unidentified trapdoor spider (CS3).

Table 7.1 Direct and Indirect Local Impacts to Fauna Habitat

Species	BCE Status	Status (WA)	Status (EPBC)	Extent in DE Including CCAC (ha)	Extent in DE Excluding CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (ha)	Extent in KIOP MLE New Disturbance Footprint Excl. CCAC (%)	Extent in Indirect Impact Zone Excl. CACC (ha)	Total Extent in Indirect Impact Zone Excl. CACC (%)*	Total Extent Impacted Excl. CACC (ha)	Total VSA Extent Excl. CACC (%)^
Frogs											
Desert Trilling Frog	CS3	-	-	10,623.32	9,449.43	1,441.31	15.25	170.76	1.77	**1,612.07**	**16.95**
Reptiles											
Gilled Slender Blue-tongue	CS1	VU	-	1,037.32	860.67	115.39	13.41	33.95	3.80	**149.34**	**17.34**
Mulga Dragon	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
Reticulated Velvet Gecko	CS3	-	-	1,967.21	1,602.48	277.35	17.31	40.09	2.44	**317.44**	**19.53**
Western Spiny-tailed Skink	CS1	VU	EN	1,902.96	1,538.22	277.35	18.03	40.09	2.54	**317.44**	**20.33**
Birds											
Bush Stone-curlew	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
Crested Bellbird	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
Major Mitchell's Cockatoo	CS3	-	-	10,623.32	9,449.43	1,441.31	15.25	170.76	1.77	**1,612.07**	**16.95**
Malleefowl	CS1	VU	VU	7,212.98	6,334.03	822.68	12.99	82.65	1.29	**905.34**	**14.16**
Peregrine Falcon	CS1	OS		913.03	741.70	103.20	13.91	16.55	2.18	**119.75**	**16.14**
Redthroat	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
Regent Parrot	CS3	-	-	10,623.32	9,449.43	1,441.31	15.25	170.76	1.77	**1,612.07**	**16.95**
Rufous Treecreeper	CS3	-	-	1,967.21	1,602.48	277.35	17.31	40.09	2.44	**317.44**	**19.53**
Southern Whiteface	CS1	VU	VU	7,678.20	7,043.16	1,049.44	14.90	103.89	1.45	**1,153.33**	**16.30**
Western Yellow Robin	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
White-browed Babbler	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
White-browed Treecreeper	CS3	-	-	2,358.66	1,971.19	387.30	19.65	53.86	2.66	**441.16**	**22.08**
Mammals											
Inland Long-eared Bat	CS2	P4	-	10,802.64	9,598.27	1,441.31	15.02	170.76	1.75	**1,612.07**	**16.69**
Kultarr	CS3	-	-	7,613.95	6,978.90	1,049.44	15.04	103.89	1.47	**1,153.33**	**16.45**
Long-tailed Dunnart	CS2	P4	-	1,037.32	860.67	115.39	13.41	33.95	3.80	**149.34**	**17.34**
Woolley's Pseudantechinus	CS3	-	-	1,037.32	860.67	115.39	13.41	33.95	3.80	**149.34**	**17.34**
Invertebrates											
Karara Millipede	CS3	-	-	3,319.58	2,887.76	419.55	14.53	47.56	1.62	**467.11**	**16.15**
Millipede sp. nov. 'PM1'	CS3	-	-	3,319.58	2,887.76	419.55	14.53	47.56	1.62	**467.11**	**16.15**
Mt Gairdner Scorpion	CS3	-	-	3,319.58	2,887.76	419.55	14.53	47.56	1.62	**467.11**	**16.15**
Northern Shield-backed Trapdoor Spider	CS2	P3	-	5,170.25	4,766.02	659.88	13.85	76.90	1.59	**736.78**	**15.38**
Ornate Trapdoor Spider	CS1	EN	-	7,110.35	6,371.06	1,010.44	15.86	112.97	1.74	**1,123.40**	**17.49**
Unidentified trapdoor spider	CS3	-	-	112.29	110.61	3.82	3.45	5.44	4.68	**9.26**	**8.37**

* Total habitat extent in the indirect impact zone is the indirect impact zone extent as a proportion of the entire extent of the habitat across both the DE (excluding vegetation within CCAC areas) and the indirect impact zone.

^ Total extent impacted by the KIOP MLE new disturbance footprint and indirect impact zone as a proportion of the total extent within both the Combined Proposal DE and indirect impact zone excluding areas that occur in CCAC.

7.2 Cumulative Impacts to Fauna Habitats

The cumulative direct impact assessments to significant fauna habitat considered existing impacts within the region. As discussed in **Section 1.2.3**, the history, context and scale of existing impacts differ greatly between the Mine Area and Wheatbelt Area of the KIOP MLE new disturbance footprint. For the Mine Area, existing impacts within CAA 1 are predominately from other mining projects in the region as described in **Section 1.3** and **Section 6.3**. For the Wheatbelt Area, existing impacts within CAA 2 are overwhelmingly from clearing for agriculture. These two areas have therefore been assessed separately, in **Section 7.2.1** and **Section 7.2.2** respectively.

7.2.1 Cumulative Assessment Area 1

The cumulative direct impact assessment for CAA 1 considered the 27 significant fauna species that are Residents or Regular Visitors of the Mine Area (**Section 3.2.2**). Impacts were quantified in terms of the existing and proposed direct impacts to DPIRD (2019) PEVSAs that are representative of fauna habitat VSAs (as per **Section 3.1**). The results are presented in **Table 7.2**.

Due to the landscape being largely intact within CAA 1, the Combined Proposal is predicted to result in a cumulative direct impact to habitat within CAA 1 of no more than 3.25% for any species. This suggests that within the wider region, the loss of fauna habitat as a result of the Combined Proposal is unlikely to be significant, with at least 96.75% of suitable habitat likely to remain within CAA 1. However, it is worthy of note that the DPIRD (2019) pre-European vegetation dataset has been mapped at a broad scale, and likely does not capture the diversity of fauna habitats and microhabitats within CAA 1 (e.g. small rock piles within an area that is otherwise not particularly rocky). Nevertheless, this assessment provides an indication of the extent of habitat in the wider area that may be suitable for significant fauna species.

Table 7.2 Cumulative Direct Impact to Fauna Habitat Within CAA 1

Species	BCE Status	Status (WA)	Status (EPBC)	Original Pre-European Extent of PEVSAs in CAA 1 (ha)	Remaining Extent of PEVSAs in CAA 1 (ha)	Historical Impact to PEVSAs in CAA 1 (ha)	KIOP MLE New Disturbance Footprint Direct Impact in CAA 1 Excl. CCAC (ha)	Total Cumulative Impact to PEVSAs in CAA 1 (ha)	Total Cumulative Impact to PEVSAs in CAA 1 (%)
Frogs									
Desert Trilling Frog	CS3	-	-	682,086.0	667,828.6	14,257.4	1,429.3	**15,686.8**	**2.30**
Reptiles									
Gilled Slender Blue-tongue	CS1	VU	-	171,661.3	166,748.1	4,913.2	107.0	**5,020.2**	**2.92**
Mulga Dragon	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**
Reticulated Velvet Gecko	CS3	-	-	166,830.0	163,109.0	3,721.0	274.4	**3,995.4**	**2.39**
Western Spiny-tailed Skink	CS1	VU	EN	166,753.9	163,032.9	3,721.0	274.4	**3,995.4**	**2.40**
Birds									
Bush Stone-curlew	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**
Crested Bellbird	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**
Major Mitchell's Cockatoo	CS3	-	-	682,086.0	667,828.6	14,257.4	1,429.3	**15,686.8**	**2.30**
Malleefowl	CS1	VU	VU	249,600.2	244,919.3	4,680.9	814.3	**5,495.2**	**2.20**
Peregrine Falcon	CS1	OS		105,472.2	102,143.0	3,329.2	103.2	**3,432.4**	**3.25**
Redthroat	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**
Regent Parrot	CS3	-	-	682,086.0	667,828.6	14,257.4	1,429.3	**15,686.8**	**2.30**
Rufous Treecreeper	CS3	-	-	166,830.0	163,109.0	3,721.0	274.4	**3,995.4**	**2.39**
Southern Whiteface	CS1	VU	VU	326,388.8	320,981.0	5,407.7	1,047.9	**6,455.6**	**1.98**
Western Yellow Robin	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**
White-browed Babbler	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**

Species	BCE Status	Status (WA)	Status (EPBC)	Original Pre-European Extent of PEVSAs in CAA 1 (ha)	Remaining Extent of PEVSAs in CAA 1 (ha)	Historical Impact to PEVSAs in CAA 1 (ha)	KIOP MLE New Disturbance Footprint Direct Impact in CAA 1 Excl. CCAC (ha)	Total Cumulative Impact to PEVSAs in CAA 1 (ha)	Total Cumulative Impact to PEVSAs in CAA 1 (%)
White-browed Treecreeper	CS3	-	-	244,797.8	237,958.2	6,839.7	384.4	**7,224.1**	**2.95**
Mammals									
Inland Long-eared Bat	CS2	P4	-	682,086.0	667,828.6	14,257.4	1,429.3	**15,686.8**	**2.30**
Kultarr	CS3	-	-	326,312.7	320,905.0	5,407.7	1,047.9	**6,455.6**	**1.98**
Long-tailed Dunnart	CS2	P4	-	171,661.3	166,748.1	4,913.2	107.0	**5,020.2**	**2.92**
Woolley's Pseudantechinus	CS3	-	-	171,661.3	166,748.1	4,913.2	107.0	**5,020.2**	**2.92**
Invertebrates									
Karara Millipede	CS3	-	-	202,298.8	198,100.5	4,198.3	418.0	**4,616.4**	**2.28**
Millipede sp. nov. 'PM1'	CS3	-	-	202,298.8	198,100.5	4,198.3	418.0	**4,616.4**	**2.28**
Mt Gairdner Scorpion	CS3	-	-	202,298.8	198,100.5	4,198.3	418.0	**4,616.4**	**2.28**
Northern Shield-backed Trapdoor Spider	CS2	P3	-	251,583.0	246,868.3	4,714.7	658.3	**5,373.0**	**2.14**
Ornate Trapdoor Spider	CS1	EN	-	396,240.0	387,980.4	8,259.6	1,007.5	**9,267.1**	**2.34**
Unidentified trapdoor spider	CS3	-	-	66,189.1	64,605.0	1,584.0	3.8	**1,587.9**	**2.40**

7.2.2 Cumulative Assessment Area 2

The cumulative direct impact assessment for CAA 2 considered only the 13 significant fauna species that are Residents or Regular Visitors of the Wheatbelt Area. Note that habitat for Peregrine Falcon in CAA 2 comprises foraging habitat only, as nesting habitat is unlikely to be present (**Section 3.2.2**).

No PEVSA was identified for VSA 12 for this assessment, as this VSA represents planted (non-locally endemic) mature *Eucalyptus* species, and therefore is incompatible with the pre-European vegetation dataset (which maps the original native vegetation presumed to have existed prior to European settlement (DPIRD, 2019)). However, this VSA is likely to be utilised by fauna, particularly given how little remnant vegetation remains within CAA 2.

Cumulative impacts within CAA 2 were quantified in terms of the existing and proposed direct impacts to DPIRD (2019) PEVSAs that are representative of fauna habitat VSAs (as per **Section 3.1**). The results are presented in **Table 7.3**.

While the Combined Proposal will directly impact no more than 12.0 ha of significant fauna habitat (in terms of PEVSAs) within CAA 2, the PEVSAs in CAA 2 have already experienced significant historical impact via clearing. The total cumulative direct impact is predicted to range from 86.96% to 88.12%.

Table 7.3 Cumulative Direct Impact to Fauna Habitat Within CAA 2

Species	BCE Status	Status (WA)	Status (EPBC)	Original Pre-European Extent of PEVSAs in CAA 2 (ha)	Remaining Extent of PEVSAs in CAA 2 (ha)	Historical Impact to PEVSAs in CAA 2 (ha)	KIOP MLE New Disturbance Footprint Direct Impact in CAA 2 Excl. CCAC (ha)	Total Cumulative Impact to PEVSAs in CAA 2 (ha)	Total Cumulative Impact to PEVSAs in CAA 2 (%)
Reptiles									
Gilled Slender Blue-tongue	CS1	VU	-	218,165.3	27,036.7	191,128.5	8.4	**191,136.9**	**87.61**
Reticulated Velvet Gecko	CS3	-	-	46,830.4	6,108.3	40,722.1	2.9	**40,725.0**	**86.96**
Western Spiny-tailed Skink	CS1	VU	EN	46,830.4	6,108.3	40,722.1	2.9	**40,725.0**	**86.96**
Birds									
Crested Bellbird	CS3	-	-	228,129.2	28,231.3	199,897.8	1.5	**199,899.4**	**87.63**
Malleefowl	CS1	VU	VU	228,129.2	28,231.3	199,897.8	8.4	**199,906.2**	**87.63**
Peregrine Falcon	CS1	OS		228,129.2	28,231.3	199,897.8	12.0	**199,909.8**	**87.63**
Redthroat	CS3	-	-	125,204.1	14,877.0	110,327.1	1.5	**110,328.7**	**88.12**
Regent Parrot	CS3	-	-	228,129.2	28,231.3	199,897.8	12.0	**199,909.8**	**87.63**
Southern Whiteface	CS1	VU	VU	135,168.0	16,071.6	119,096.4	1.5	**119,098.0**	**88.11**
Western Yellow Robin	CS3	-	-	125,204.1	14,877.0	110,327.1	1.5	**110,328.7**	**88.12**
White-browed Babbler	CS3	-	-	125,204.1	14,877.0	110,327.1	1.5	**110,328.7**	**88.12**
Mammals									
Long-tailed Dunnart	CS2	P4	-	218,165.3	27,036.7	191,128.5	8.4	**191,136.9**	**87.61**
Woolley's Pseudantechinus	CS3	-	-	218,165.3	27,036.7	191,128.5	8.4	**191,136.9**	**87.61**

8.0 Significance of Residual Impacts

The *WA Environmental Offsets Guidelines* (Government of WA) (GoWA, 2014) provides a residual impact significance model that outlines how significance of residual impacts can be determined, and when an offset is likely to be required, or may be required, in relation to EPA environmental factors. The model defines four levels of significance for residual impacts:

- Unacceptable impacts: those impacts which are environmentally unacceptable or where no offset can be applied to reduce the impact. Offsets are not appropriate in all circumstances, as some environmental values cannot be offset.
- Significant impacts requiring an offset: any significant residual impact of this nature will require an offset. These generally relate to any impacts to species, ecosystems, or reserve areas protected by statute or where the cumulative impact is already determined to be at a critical level.
- Potentially significant impact which may require an offset: the residual impact may be significant depending on the context and extent of the impact. These relate to impacts that are likely to result in a species or ecosystem requiring protection under statute or increasing the cumulative impact to a critical level. Whether these impacts require an offset will be determined by the decision-maker based on information provided by the proponent or applicant and expert judgement.
- Impacts which are not significant: impacts which do not trigger the above categories are not expected to have a significant impact on the environment and therefore do not require an offset.

The residual impact significance model from GoWA (2014) was used to assist in categorising the residual impacts of the Combined Proposal and identify whether offsets may be required. The model was applied to significant fauna species in terms of predicted impact to their habitats, and was undertaken for all significant fauna species that are Residents or Regular Visitors of the KIOP MLE new disturbance footprint (**Section 3.2.2**). The results are discussed in the following sections and summarised in **Table 8.1**.

Table 8.1 Summary of Results of Assessment of Significance of Residual Impacts to Significant Fauna Species Against GoWA (2014) Clearing Principle (b)

Species	BCE Status	Status (WA)	Status (EPBC)	Unacceptable Impact	Significant Impact	Potentially Significant Impact	Impact Not Likely to be Significant
Frogs							
Desert Trilling Frog	CS3	-	-	-	-	-	✓
Reptiles							
Gilled Slender Blue-tongue	CS1	VU	-	-	✓	-	-
Mulga Dragon	CS3	-	-	-	-	-	✓
Reticulated Velvet Gecko	CS3	-	-	-	-	-	✓
Western Spiny-tailed Skink	CS1	VU	EN	-	✓	-	-
Birds							
Bush Stone-curlew	CS3	-	-	-	-	-	✓
Crested Bellbird	CS3	-	-	-	-	-	✓
Major Mitchell's Cockatoo	CS3	-	-	-	-	-	✓
Malleefowl	CS1	VU	VU	-	✓	-	-
Peregrine Falcon	CS1	OS	-	-	-	-	✓
Redthroat	CS3	-	-	-	-	-	✓
Regent Parrot	CS3	-	-	-	-	-	✓
Rufous Treecreeper	CS3	-	-	-	-	-	✓
Southern Whiteface	CS1	VU	VU	-	-	-	✓
Western Yellow Robin	CS3	-	-	-	-	-	✓
White-browed Babbler	CS3	-	-	-	-	-	✓
White-browed Treecreeper	CS3	-	-	-	-	-	✓
Mammals							
Inland Long-eared Bat	CS2	P4	-	-	-	-	✓
Kultarr	CS3	-	-	-	-	-	✓
Long-tailed Dunnart	CS2	P4	-	-	-	✓	-

Species	BCE Status	Status (WA)	Status (EPBC)	Unacceptable Impact	Significant Impact	Potentially Significant Impact	Impact Not Likely to be Significant
Woolley's Pseudantechinus	CS3	-	-	-	-	-	✓
Invertebrates							
Karara Millipede	CS3	-	-	-	-	✓	-
Millipede PM1	CS3	-	-	-	-	-	✓
Mt Gairdner Scorpion	CS3	-	-	-	-	✓	-
Northern Shield-backed Trapdoor Spider	CS2	P3	-	-	-	-	✓
Ornate Trapdoor Spider	CS1	EN	-	-	-	-	✓
Unidentified trapdoor spider	CS3	-	-	-	-	-	✓
Count				**0**	**3**	**3**	**21**

8.1.1 Unacceptable Impacts

The assessment against the residual impact significance model found that the residual impact to any significant fauna species would not be environmentally unacceptable and/or could be able to be offset.

8.1.2 Significant Impacts

The assessment against the residual impact significance model found that residual impacts to three significant fauna species are significant and will require an offset.

8.1.2.1 Reptiles

Gilled Slender Blue-tongue (WA: VU)

- This species is known from the Midwest coast from the Murchison River to the Irwin River and inland to Mt Magnet, although within this region it is known from only a few locations (Bush et al., 2007). The rocky crests of BIF ridges provide habitat for this species, and it has been recorded three times within the Karara Area and surrounds in rocky environments, including a specimen from Karara Ridge and one from Mungada Ridge (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE. The potential cumulative impact is predicted to be 2.9%, however it is possible that the PEVSAs that represent VSAs 1 and 2 have somewhat overrepresented the extent of potentially suitable habitat for this species present within CAA 1 (i.e. rocky ridges and hills). This species may utilise vegetation in CAA 2 for dispersal, and there is a predicted cumulative impact within CAA 2 of 87.6%, although the Combined Proposal will directly impact only 8.4 ha of such vegetation.
- The rocky ironstone hills that provide habitat for this species in CAA 1 tend to be linear, and consequently it is possible that direct impact to these hills in the Mine Area may result in long-term risk of loss of gene flow (Kristancic & Bamford, 2025).
- Return of rocky habitats and microhabitats during rehabilitation may help mitigate some impact from the Combined Proposal.
- The overall outcome for this species is “significant residual impact” given the KIOP MLE Proposal will directly impact significant habitat for this species, and the species is listed under the BC Act.

Western Spiny-tailed Skink (WA: VU; EPBC: EN)

- This species was once widely distributed through semi-arid areas of southwestern WA from Minnivale (150 km east-northeast of Perth) north to Mullewa and east to Perenjori and south of Yalgoo. However, clearing for agriculture has removed most of its potential habitat through this area and the population has consequently declined as a result of isolation through fragmentation (DEC, 2012).
- The species is locally abundant in York Gum woodlands on loam and clay flats in the Karara Area. While the condition of York Gum patches in the Wheatbelt Area is poorer, individuals do persist (Kristancic & Bamford, 2025).

- There is a predicted direct and indirect local impact to 20% of habitat within the Combined Proposal DE, however only a 2.4% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 87.0%.
- Return of log piles during rehabilitation may help mitigate some impact from the Combined Proposal. These log piles would ideally be from York Gum but other large trees including those from *Melaleuca* spp. may be suitable. The log piles should provide a range of shelter sizes, from large hollows to narrow crevices, and ideally should be located amongst shrubs.
- The overall outcome for this species is "significant residual impact" given the KIOP MLE Proposal will directly impact significant habitat for this species, and the species is listed under the BC Act and EPBC Act.

8.1.2.2 Birds

Malleefowl (WA: VU; EPBC: VU)

- This species is widespread in the general region surrounding the Karara Area, and is known from a few records in the Wheatbelt, although these are predominately restricted to larger areas of remnant vegetation such as nature reserves (Kristancic & Bamford, 2025). More widely, it is known from most of southern Australia including WA, South Australia (SA), New South Wales (NSW) and Victoria (DCCEEW, 2024a).
- There is a predicted direct and indirect local impact to 14% of habitat within the Combined Proposal DE (nesting habitat in the Mine Area, and foraging habitat in the Wheatbelt Area), however only a 2.2% cumulative impact to all potentially suitable nesting habitat within CAA 1. The cumulative impact to foraging habitat within CAA 2 is predicted to be 87.6%, although the Combined Proposal will result in a direct impact within CAA 2 of only 8.4 ha.
- The BCE 2025 assessment identified newly constructed Malleefowl mounds within the area designated for the TSF of the KIOP MLE Proposal, suggesting that these birds may have been displaced from previously impacted habitat to the north and may now be utilising sub-optimal habitat (Kristancic & Bamford, 2025).
- Malleefowl are known to have been impacted at KIOP by vehicle strike and predation. These impacts can be partially mitigated at the local scale by enforcement of speed limits, and feral animal control (**Section 5.2**).
- The overall outcome for this species is "significant residual impact" given the KIOP MLE Proposal will directly impact significant habitat for this species, and the species is listed under the BC Act and EPBC Act.

8.1.3 Potentially Significant Impacts

The assessment against the residual impact significance model found that residual impacts to three significant fauna species are potentially significant and may require an offset.

8.1.3.1 Mammals

Long-tailed Dunnart (WA: P4)

- This species is known from several widespread localities between the Pilbara, Goldfields and Gibson Desert, and the McDonnell Ranges (NT) (Menkhorst & Knight, 2021). It inhabits rugged, rocky outcrops (Burbidge et al., 2008).
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE. There is a predicted 2.9% cumulative impact within CAA 1, however it is possible that the PEVSAs that represent VSAs 1 and 2 have somewhat overrepresented the extent of potentially suitable habitat for this species present within CAA 1 (i.e. rocky ironstone and granitic areas). This species may utilise vegetation in CAA 2 for dispersal, and there is a predicted cumulative impact within CAA 2 of 87.6%, although the Combined Proposal will directly impact only 8.4 ha of such vegetation.
- The rocky ironstone hills that provide habitat for this species in CAA 1 tend to be linear, and consequently it is possible that direct impact to these hills in the Mine Area may result in long-term risk of loss of gene flow. The size of the home range of the Long-tailed Dunnart is not known, but other species of dunnart can have home ranges as small as 1.8 ha.
- Return of rocky habitats and microhabitats during rehabilitation may help mitigate some impact from the Combined Proposal, particularly if these are established in proximity to remaining areas of VSA 1 and 2.
- This species is at risk of vehicle strike and predation. These impacts can be partially mitigated at the local scale by enforcement of speed limits, and feral animal control (**Section 5.2**).
- The overall outcome for this species is "potentially significant residual impact" given the KIOP MLE Proposal will directly impact significant habitat for this species, however the impact is unlikely to result in the species becoming eligible for listing under the BC Act or EPBC Act.

8.1.3.2 Invertebrates

Karara Millipede (CS3)

- According to BCE records, this species has been found only on ironstone ridges from Karara, Blue Hills and Mungada, and is therefore classed as a short range endemic (SRE) (Harvey, 2002). It appears to be locally abundant in rocky areas of the ironstone hills in the region (VSA 1), so is likely to be present in such landscapes within the Mine Area and Combined Proposal DE. However, it is unlikely to be widespread (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, and 2.3% cumulative impact within CAA 1. However, given little is known about this species and its potential distribution, suitability of habitat within the wider CAA 1 is unknown. It is also possible that the PEVSAs that represent VSA 1 have somewhat overrepresented the extent of potentially suitable habitat for this species present within CAA 1 (i.e. rocky ironstone ridges and hills).
- The Wheatbelt Area is out of range for this species.
- The dispersal area of this species is unknown, but the rocky ironstone hills that provide habitat for this species in CAA 1 tend to be linear, and consequently it is possible that direct impact to these hills in the Mine Area may result in long-term risk of loss of gene flow.

- Return of rocky habitats and microhabitats during rehabilitation may help mitigate some impact from the Combined Proposal, particularly if these are established in proximity to remaining areas of VSA 1. However, the extent to which this species will recolonise is not known.
- The overall lack of knowledge on the species and its ecology suggests the precautionary principle should be applied. Therefore, the outcome for this species is "potentially significant residual impact" given the KIOP MLE Proposal will directly impact habitat that is potentially significant to the maintenance of this species.

Mt Gairdner Scorpion (CS3)

- This species is currently only known from two locations: a rocky area at Karara and approximately 200 km southeast at Gairdner Range (Kristancic & Bamford, 2025). It is considered by Harvey (2006) to be an SRE species.
- Based on the specimen from Karara being collected on a rocky landscape, it is presumed to be more or less restricted to rocky environments (i.e. VSA 1), including those within the Mine Area, Combined Proposal DE and surrounding area (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, and 2.3% cumulative impact within CAA 1. However, given little is known about this species and its potential distribution, suitability of habitat within the wider CAA 1 is unknown. It is also possible that the PEVSAs that represent VSA 1 have somewhat overrepresented the extent of potentially suitable habitat for this species present within CAA 1 (i.e. rocky ironstone ridges and hills).
- The Wheatbelt Area is out of range for this species.
- The dispersal area of this species is unknown, but the rocky ironstone hills that provide habitat for this species in CAA 1 tend to be linear, and consequently it is possible that direct impact to these hills in the Mine Area may result in long-term risk of loss of gene flow.
- Return of rocky habitats and microhabitats during rehabilitation may help mitigate some impact from the Combined Proposal, particularly if these are established in proximity to remaining areas of VSA 1. However, the extent to which this species will recolonise is not known.
- The overall lack of knowledge on the species and its ecology suggests the precautionary principle should be applied. Therefore, the outcome for this species is "potentially significant residual impact" given the KIOP MLE Proposal will directly impact habitat that is potentially significant to the maintenance of this species.

8.1.4 Impacts that are Unlikely to be Significant

The residual impacts to the remaining 21 significant fauna species are unlikely to be significant, as discussed in the following sections. Mitigation measures such as control of feral predators, establishing effect rehabilitation and others as discussed in **Section 5.2** may partly mitigate the local impact to the species and facilitate medium to long term recolonisation. Residual impacts to these species are unlikely to result in a change in the State or Commonwealth conservation status, or result in the species being listed at State or Commonwealth level.

8.1.4.1 Frogs

Desert Trilling Frog (CS3)

- This species is widespread across the arid zone of Australia. The Karara Area is on the southwestern edge of its known range, but it extends east through the southern arid zone to as far as Canberra (WA Museum, n.d.).
- The Wheatbelt Area is out of range for this species.
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.3% cumulative impact to all potentially suitable habitat within CAA 1.
- The species is sensitive to hydrological change, and breeding may be impacted by the loss or reduction of seasonal pools. However, the Combined Proposal is unlikely to result in any significant changes to surface water hydrology (Stantec, 2024). Therefore, primary feasible impact to the species will be a result of direct removal of habitat.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

8.1.4.2 Reptiles

Mulga Dragon (CS3)

- This species has a patchy distribution within the southern arid interior of WA, but appears to be locally common in acacia shrublands around Karara, Blue Hills and Mungada (Kristancic & Bamford, 2025), which represents the southwestern edge of its known range. Acacia shrublands are extensive in the Karara Area and surrounds.
- The Wheatbelt Area is out of range for this species.
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact to all potentially suitable habitat within CAA 1. Therefore, there is unlikely to be substantial loss of habitat for this species in the wider area.

Reticulated Velvet Gecko (CS3)

- This species is largely confined to the Wheatbelt and Goldfields, but has been recorded just south of Mungada near the Mine Area (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 20% of habitat within the Combined Proposal DE, however only a 2.4% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 87.0%.
- The species is widespread and while restricted to eucalypt trees, these are common throughout CAA 1 and beyond, and relatively common in CAA 2 (where vegetation remains).
- Return of smooth-barked *Eucalyptus* species during rehabilitation may help mitigate some impact from the Combined Proposal in the medium to long term (i.e. once the trees mature and establish).
- The impact of the KIOP MLE Proposal is unlikely to change the conservation status of the species.

8.1.4.3 Birds

Southern Whiteface (WA: VU; EPBC: VU)

- While this species is listed under the BC Act and EPBC Act, the Combined Proposal is not likely to substantially impact significant habitat for this species.
- This species occurs across most of mainland Australia south of the tropics, from the northeastern edge of the Wheatbelt east to the Great Dividing Range, and lives in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs. They forage almost exclusively on the ground, favouring habitat with low tree densities and a herbaceous understorey litter cover, and mainly feed on insects, spiders, and seeds, largely gleaned from the bare ground or leaf litter (DCCEEW, 2023).
- The Southern Whiteface was listed as Vulnerable under the EPBC Act as of March 2023, based on evidence of a >50% decline in abundance since 2000. However, this decline occurred mainly in the eastern subspecies, with a lesser decline in WA, and BCE observations are that the species is widespread and common in the Murchison and Goldfields regions (Kristancic & Bamford, 2025).
- Potential habitat for this species is likely where dense acacia thickets were juxtaposed with open, low shrubland and bare ground. This is not considered to be uncommon in the wider area.
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact within CAA 1. The cumulative impact within CAA 2 is predicted to be 88.1%, although the Combined Proposal will result in a direct impact within CAA 2 of only 1.5 ha. The impacted habitats are likely to be suitable for breeding, foraging and/or dispersal.
- The predicted impact to this species is unlikely to represent a substantial reduction in habitat within the wider local area or region.

Bush Stone-curlew (CS3)

- This species occurs throughout mainland Australia and was formerly quite common but has declined in numbers through loss of habitat and predation by foxes and feral cats (Birdlife Australia, 2025).
- The species was assigned a status of CS3 as BCE considered that they have declined in the region and that their persistence in the area is dependent on the small amounts of remaining native vegetation (Kristancic & Bamford, 2025). The species was previously categorised as P4 by DBCA but has since been removed from the priority fauna list.
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact to all potentially suitable habitat within CAA 1.
- The species is expected to be only an irregular visitor to the Wheatbelt Area.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

- This species is a ground-nesting bird and prefers tall shrublands that provide cover (Kristancic & Bamford, 2025). Due to the ground-nesting nature of the species, it is at risk of predation. These impacts can be partially mitigated at the local scale by feral animal control (**Section 5.2**).

Crested Bellbird (CS3)

- This species occurs throughout most of the drier parts of Australia, including all mainland states and territories (ALA, 2025).
- Within the Combined Proposal DE and surrounds it appears to prefer areas of dense thickets of *Acacia* spp. and other tall shrubs (Kristancic & Bamford, 2025), which are common throughout CAA 1 and beyond.
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 87.6%.
- This species is forages on the ground or in low bushes for seeds and small invertebrates (ALA, 2025) and consequently it has a moderate risk of predation. These impacts can be partially mitigated at the local scale by feral animal control (**Section 5.2**).
- The impact of the KIOP MLE Proposal is unlikely to change the conservation status of the species.

Major Mitchell's Cockatoo (CS3)

- This species occurs throughout inland, arid areas of mainland Australia. Their numbers and range have declined primarily through loss of habitat and the availability of nesting hollows (Birdlife Australia, 2025). They may also be at risk of replacement within an area by over-abundant native species such as the Galah and Little Corella (Kristancic & Bamford, 2025).
- Individuals are potentially nesting within the Mine Area (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.3% cumulative impact within CAA 1.
- The species is expected to be only an irregular visitor to the Wheatbelt Area.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.
- The species utilises trees hollows for nesting. Return of *Eucalyptus* species during rehabilitation is recommended but it is unlikely that this will mitigate any impacts from the Combined Proposal in the short to medium term given the length of time it takes for trees to form suitable hollows.

Peregrine Falcon (WA: OS)

- This species is widespread in the landscape. The Combined Proposal will impact foraging habitat for this species but the KIOP MLE new disturbance footprint is unlikely to support nesting as the areas lack elevated landscapes/cliffs and tall trees (Kristancic & Bamford, 2025).
- This species maintains large home ranges of approximately 20 – 30 km^2 (2,000 – 3,000 ha) (The Australian Museum, 2019), and individuals will not be reliant on any habitats in the Combined Proposal area for foraging, dispersal or breeding.

- There is a predicted direct and indirect local impact to 16% of foraging habitat within the Combined Proposal DE, however only a 3.3% cumulative impact within CAA 1. The cumulative impact within CAA 2 is predicted to be 87.6%.
- The predicted impact is unlikely to represent a substantial reduction in foraging habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

Redthroat (CS3)

- This species occurs in arid and semi-arid areas, including most of western, central and southeastern WA, and extending into SA, southern Northern Territory (NT), and the western parts of Victoria, NSW and Queensland (ALA, 2025).
- Habitat for this species across its range is predominantly acacia and chenopod shrublands with complex understoreys, although it has been recorded in mallee with a diverse understory, semi-arid woodlands, and *Banksia* and tea tree thickets (ALA, 2025).
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 88.1%.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.
- This species is predominately ground-dwelling (ALA, 2025) and consequently it has a moderate risk of predation. These impacts can be partially mitigated at the local scale by feral animal control (**Section 5.2**).

Regent Parrot (CS3)

- This species is known from southern Australia. Within WA, it primarily inhabits eucalypt groves and other wooded areas (ALA, 2025). These habitats are common throughout CAA 1 and beyond, and some areas remain in CAA 2 (including areas that are larger and in better condition than the KIOP MLE new disturbance footprint).
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.3% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 87.6%.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.
- This species predominately forages on the ground (ALA, 2025) and consequently it has a moderate risk of predation. These impacts can be partially mitigated at the local scale by feral animal control (**Section 5.2**).

Rufous Treecreeper (CS3)

- This species occurs throughout southwestern WA and extends into southern SA. Habitat includes trees in eucalypt woodlands and shrublands (ALA, 2025), which are common throughout CAA 1 and beyond.

- There is a predicted direct and indirect local impact to 20% of habitat within the Combined Proposal DE, however only a 2.4% cumulative impact to all potentially suitable habitat within CAA 1.
- The species is expected to be only an irregular visitor to the Wheatbelt Area.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

Western Yellow Robin (CS3)

- This species occurs throughout southwestern WA and the interzone, and extends into southern SA (ALA, 2025).
- Habitat includes open eucalypt forests, woodlands, and scrublands, with a preference for habitats that have a complex understory, thick canopy, ample leaf litter, and fallen logs (Birda, 2024). Such habitat is common throughout CAA 1 and beyond, and some areas remain in CAA 2 (including areas that are larger and in better condition than the KIOP MLE new disturbance footprint).
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 88.1%.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

White-browed Babbler (CS3)

- This species is known from southern Australia. It primarily inhabits dry, sclerophyll woodlands and open forests with tall or dense understorey (ALA, 2025). These habitats are quite common throughout CAA 1 and beyond, and some areas remain in CAA 2 (including areas that are larger and in better condition than the KIOP MLE new disturbance footprint).
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, however only a 2.0% cumulative impact to all potentially suitable habitat within CAA 1. The cumulative impact within CAA 2 is predicted to be 88.1%.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.
- This species predominately forages on the ground (ALA, 2025) and consequently it has a moderate risk of predation. These impacts can be partially mitigated at the local scale by feral animal control (**Section 5.2**).

White-browed Treecreeper (CS3)

- This species occurs throughout arid Australia including central WA, southern NT, SA, and western to central Victoria, NSW and Queensland (ALA, 2025). Habitat includes arid and semi-arid *Acacia*, *Casuarina*, or *Callitris* spp. woodlands and shrublands (Birda, 2024). Such habitat is common throughout CAA 1 and beyond.

- There is a predicted direct and indirect local impact to 22% of habitat within the Combined Proposal DE, however only a 3.0% cumulative impact to all potentially suitable habitat within CAA 1.
- The species is expected to be vagrant within the Wheatbelt Area.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

8.1.4.4 Mammals

Inland Long-eared Bat (WA: P4)

- This species occurs throughout southern WA (except the southwestern corner), east to the Eyre Peninsula in SA. It possibly occurs as far north as the Hamersley Ranges but does not extend onto the Nullarbor Plain. Within this range, it occurs within shrublands, grassland and eucalypt woodlands (Churchill, 2008).
- This species is nocturnal and shelters during the day in tree cavities, under bark and within foliage (Churchill, 2008), and utilises shrubby areas for foraging (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.3% cumulative impact within CAA 1.
- The species is expected to be only an irregular visitor to the Wheatbelt Area.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.
- The species utilises trees with hollows and loose bark for shelter. Return of *Eucalyptus* species during rehabilitation is recommended but it is unlikely that this will mitigate any impacts from the Combined Proposal in the short to medium term given the length of time it takes for trees to form suitable hollows.

Woolley's Pseudantechinus (CS3)

- This species inhabits rocky hillsides, usually vegetated with acacia scrub or spinifex grass, in the western arid area of WA (ALA, 2025). The Combined Proposal DE is located at the southern limit of its range, but the species appears to be common on the ironstone ridges throughout the Karara Area and nearby (based on surveys by BCE) (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.9% cumulative impact within CAA 1, however it is possible that the PEVSAs that represent VSAs 1 and 2 have somewhat overrepresented the extent of potentially suitable habitat for this species present within CAA 1 (i.e. rocky ironstone and granitic areas). This species may utilise vegetation in CAA 2 for dispersal, and there is a predicted cumulative impact within CAA 2 of 87.6%, although the Combined Proposal will directly impact only 8.4 ha of such vegetation.
- Return of rocky habitats and microhabitats during rehabilitation may help mitigate some impact from the Combined Proposal, particularly if these are established in proximity to remaining areas of VSA 1 and 2.

- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

8.1.4.5 Invertebrates

Millipede sp. nov. 'PM1' (CS3)

- This species has been recorded on Karara Ridge in the Combined Proposal DE (Kristancic & Bamford, 2025), but has been noted to be "relatively widespread in the northern wheatbelt region of Western Australia, ranging from East Yuna Nature Reserve in the north to Lake Ninnan Shire Reserve in the south, a linear distance of some 310 km" (Harvey, 2006). It is considered by Harvey (2006) to be an SRE species.
- The species is likely to be locally abundant in rocky areas of the ironstone hills in the Mine Area, Combined Proposal DE and wider region (VSA 1). However it is unlikely to be widespread (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 16% of habitat within the Combined Proposal DE, and 2.3% cumulative impact within CAA 1. However, it is possible that the PEVSAs that represent VSA 1 have somewhat overrepresented the extent of potentially suitable habitat for this species present within CAA 1 (i.e. rocky ironstone ridges and hills).
- The Wheatbelt Area is out of range for this species.
- The dispersal area of this species is unknown, but the rocky ironstone hills that provide habitat for this species in CAA 1 tend to be linear, and consequently it is possible that direct impact to these hills in the Mine Area may result in long-term risk of loss of gene flow.
- Return of rocky habitats and microhabitats during rehabilitation may help mitigate some impact from the Combined Proposal, particularly if these are established in proximity to remaining areas of VSA 1. However, the extent to which this species will recolonise is not known.
- While there is not a large amount of information available on this species and its ecology, it is known from a relatively large range of 310 km and has known locations within conservation reserves. It is unlikely that the KIOP MLE Proposal will substantially impact habitat that is significant to the maintenance of this species.

Northern Shield-backed Trapdoor Spider (WA: P3)

- This species is known from multiple records including within 100 km of the Combined Proposal DE (Rix et al., 2018). These records include locations in conservation reserve (Barnong National Park and Karara Conservation Park).
- It was previously thought to occur predominately on gravelly loam soils of the ironstone ridges and associated slopes of the Combined Proposal DE and surrounds, but BCE surveys in 2020 and 2024 found it to be more widespread lower in the landscape on sandy loam to loam soils. The distribution within CAA 1 is thus extensive (Kristancic & Bamford, 2025).
- The Wheatbelt Area is out of range for this species.
- There is a predicted direct and indirect local impact to 15% of habitat within the Combined Proposal DE, however only a 2.1% cumulative impact within CAA 1.
- The Wheatbelt Area is out of range for this species.

- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area do not have specific values that are important to the maintenance of this species, including at a local level.

Ornate Trapdoor Spider (WA: EN)

- This species is known to be abundant in heavy loam/sand soils low in the landscape in the Karara area, well away from rocky ridges. It was previously known from very few records but may be widespread and abundant in the area in suitable soils (Kristancic & Bamford, 2025).
- The Wheatbelt Area is out of range for this species.
- There is a predicted direct and indirect local impact to 17% of habitat within the Combined Proposal DE, however only a 2.3% cumulative impact within CAA 1.
- The Wheatbelt Area is out of range for this species.
- The predicted impact is unlikely to represent a substantial reduction in habitat for this species. Habitat units in the KIOP MLE Proposal area likely do not have specific values that are important to the maintenance of this species, including at a local level.

Unidentified Trapdoor Spider (CS3)

- This species is known from one collection made by BCE from the mine area in 2020. It differs from the other trapdoor species of the area by having more complex lid and fan architecture. However, it could not be identified to species level by the WA Museum given the collection was of a juvenile female (Kristancic & Bamford, 2025).
- Based on locations recorded for the BCE 2025 assessment, the species is presumed to favour sandy soils near granite outcrops in the Combined Proposal DE and surrounds (i.e. VSA 2). It is not known to occur within the Wheatbelt Area (Kristancic & Bamford, 2025).
- There is a predicted direct and indirect local impact to 8% of habitat within the Combined Proposal DE, and 2.4% cumulative impact within CAA 1.
- The location of direct and indirect impacts to VSA 2 are unlikely to result in fragmentation of habitat or interruption to dispersal, as the Mine Area will likely be impacting the eastern edge of the local distribution of the species, with other suitable habitat occurring to the south and west of the Combined Proposal DE.
- The scale of predicted local and regional impact to this specie is low, and is unlikely to represent a substantial reduction in habitat for this species.

9.0 Assessment Against Significant Impact Guidelines 1.1

The KIOP MLE Proposal will directly and indirectly impact the following three species which are EPBC listed and therefore represent matters of national environmental significance (MNES):

- Western Spiny-tailed Skink (WA: VU; EPBC: EN).
- Malleefowl (WA: VU; EPBC: VU).
- Southern Whiteface (WA: VU; EPBC: VU).

Therefore, these three species were also assessed against the DCCEEW *significant impact guidelines 1.1* (published as Department of the Environment (DoE, 2013)). There are no other EPBC-listed fauna species that are considered to be Resident or Regular Visitors of the KIOP MLE new disturbance footprint (**Section 3.2.2**), and therefore the KIOP MLE Proposal is not predicted to significantly impact any other EPBC-listed species additional to the three listed above.

The assessment against the significant impact criteria of the direct and indirect impacts to the these fauna species as a result of the KIOP MLE Proposal is presented in **Table 9.1** to **Table 9.3**.

Implementation of the KIOP MLE Proposal is likely to trigger three of the nine significant impact criteria for Western Spiny-tailed Skink, five of nine for the Malleefowl, and two of nine for the Southern Whiteface.

Table 9.1 Assessment of Western Spiny-tailed Skink Against DCCEEW Significant Impact Guidelines 1.1

Significant Impact Criteria	Likelihood	Rationale
Lead to a long-term decrease in the size of a population	Likely	The species has already experienced loss of habitat and colonies as a result of KIOP and MIOP. Predation pressure has increased due to feral animals and greater abundance of native species in the local area. These impacts and degradation of colony habitat by feral herbivores are likely to continue with implementation of the KIOP MLE Proposal.
Reduce the area of occupancy of the species	Unlikely	The distribution of the species has contracted, with some populations now only found on private land or in isolated reserves. Despite this, the area to be impacted by the Combined Proposal is negligible compared to the existing habitat in the wider area and across the species' range.
Fragment an existing population into two or more populations	Unlikely	The impact areas are localised and do not serve as corridors between other suitable habitat for the species.
Adversely affect habitat critical to the survival of a species	Likely	Critical habitat includes woodland areas that provide log piles. There will be direct impact to 277 ha of such habitat and potential indirect impact to 40 ha, however the impact will be localised.
Disrupt the breeding cycle of a population	Unlikely	Breeding is unlikely to be disrupted by the Combined Proposal at a regional scale.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	There will be direct impact to 277 ha of habitat and potential indirect impact to 40 ha. However, while local population declines are expected, these are unlikely to significantly affect the species at a broader regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Likely	Invasive species are not listed as a known or expected threat to Western Spiny-tailed Skink under the species recovery plan (DEC, 2012), except for where this involves the introduction of exotic predators or rats onto islands occupied by this species. However, predation by invasive species such as foxes, cats and over-abundant native species including the Little Crow is a known threat. Management measures are recommended to control these impacts.
Introduce disease that may cause the species to decline	Unlikely	There are no disease threats currently documented as affecting this species. It is therefore expected that diseases are unlikely to be introduced by the Combined Proposal.
Interfere with the recovery of the species	Unlikely	Ongoing habitat loss and lack of connectivity hinder recovery efforts outlined in the national recovery plan for the species. However, no active direct recovery actions are currently being carried out within the Combined Proposal DE or its vicinity.

Table 9.2 Assessment of Malleefowl Against DCCEEW Significant Impact Guidelines 1.1

Significant Impact Criteria	Likelihood	Rationale
Lead to a long-term decrease in the size of an important population of a species	Likely	The species has already experienced displacement and loss of habitat as a result of KIOP and MIOP, and loss of individuals through vehicle strike. Predation pressure has increased due to feral animals and greater abundance of native species in the local area. These impacts are likely to continue with implementation of the KIOP MLE Proposal.
Reduce the area of occupancy of an important population	Likely	There will be direct impact to 814 ha of nesting habitat in the Mine Area and to 8 ha of foraging habitat in the Wheatbelt Area. The impact area in the Mine Area includes habitat that appears to be currently supporting birds that were previously displaced (Kristancic & Bamford, 2025). Despite this, the area to be impacted by the Combined Proposal is negligible compared to the existing habitat in the wider area and across the species' range.
Fragment an existing important population into two or more populations	Unlikely	While habitat fragmentation is a major threat across the species entire distribution, the Combined Proposal is unlikely to significantly impact its ability to move throughout the landscape locally or regionally.
Adversely affect habitat critical to the survival of a species	Likely	There will be direct impact to 814 ha of nesting habitat and potentially indirectly impact a further 72 ha. However, this impact will be localised.
Disrupt the breeding cycle of an important population	Possible	Recently active mounds may be impacted within the proposed TSF impact area. However, evidence suggests the birds are capable of relocating successfully (Kristancic & Bamford, 2025).
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	There will be direct and indirect impact to habitat used for nesting and foraging, however this represents a minor and localised reduction and is not expected to have a significant impact on the species at the regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Likely	Invasive predators and some invasive weeds such as buffel grass are listed as a known threat to Malleefowl in the national recovery plan (DCCEEW, 2024a). Foxes and cats are major predators and may increase in numbers in the local area as a result of the KIOP MLE Proposal. Management measures are recommended to control these impacts.
Introduce disease that may cause the species to decline	Unlikely	There are no disease threats currently documented as affecting this species. It is therefore expected that diseases are unlikely to be introduced by the Combined Proposal.
Interfere substantially with the recovery of the species	Unlikely	Ongoing habitat loss and increased predation hinder recovery efforts outlined in the national recovery plan for the species. However, no active direct recovery actions are currently being carried out within the Combined Proposal DE or its vicinity.

Table 9.3 Assessment of Southern Whiteface Against DCCEEW Significant Impact Guidelines 1.1

Significant Impact Criteria	Likelihood	Rationale
Lead to a long-term decrease in the size of an important population of a species	Unlikely	Southern Whiteface records are abundant within 40 km of the Mine Area and there are records within 40 km of the Wheatbelt Area. The small number of individuals that were recorded within the Combined Proposal DE do not constitute an 'important population'. Furthermore, any individuals living in the immediate KIOP MLE Proposal area will readily move to surrounding areas during implementation of the Proposal. The records in the Combined Proposal DE are not near the limit of the species' range.
Reduce the area of occupancy of an important population	Unlikely	There will be direct impact to 1,049 ha of habitat and potential indirect impact to 104 ha. However, the area to be impacted by the Combined Proposal is negligible compared to the existing habitat in the wider area and across the species' range, and the population in the KIOP MLE Proposal area is unlikely to be important to the maintenance of the species. The loss of a small quantity of vegetation in the KIOP MLE Proposal area will not reduce its area of occupancy or displace an important population.
Fragment an existing important population into two or more populations	Unlikely	This species is mobile and is expected to readily move if disturbed and have a shifting activity area. The KIOP MLE Proposal is not expected to fragment the existing population.
Adversely affect habitat critical to the survival of a species	Likely	The species depends on open woodlands with dead timber and herbaceous litter (DCCEEW, 2023). There will be direct impact to 1,049 ha of habitat for this species and potential indirect impact to 104 ha. However, this impact will be localised and is negligible compared to the existing habitat in the wider area and across the species' range
Disrupt the breeding cycle of an important population	Unlikely	This species builds a dome-shaped nest with a side entrance mostly in a hollow branch, a tree trunk, crevice between branches, a stump, a fence post or in a recumbent log entrance through a knot-hole or crack. Nests are made with grass, bark, rootlets, feathers and wool and lined with feathers, wool, fur and soft plant down (Johnstone et al., 2004). This type of habitat and materials are widely available in the local and regional area. Based on the geographic records, Southern Whiteface breeds in many locations in the semi-arid areas of WA, and there is no evidence to indicate that the individuals recorded in and around the Combined Proposal DE represent an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	There will be direct impact to 1,049 ha of habitat and potential indirect impact to 104 ha. However, the area to be impacted by the Combined Proposal is negligible compared to the existing habitat in the wider area and across the species' range and is unlikely to result in a decline in the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Possible	While not a primary threat, invasive species may contribute to species loss via predation. Foxes and cats are major predators and may increase in numbers in the local area as a result of the KIOP MLE Proposal. Management measures are recommended to control these impacts.

Significant Impact Criteria	Likelihood	Rationale
Introduce disease that may cause the species to decline	Unlikely	There are no disease threats currently documented as affecting this species. It is therefore expected that diseases are unlikely to be introduced by the Combined Proposal.
Interfere substantially with the recovery of the species	Unlikely	Ongoing habitat loss and degradation hinder recovery efforts outlined in the national recovery plan for the species. However, no active direct recovery actions are currently being carried out within the Combined Proposal DE or its vicinity.

10.0 Conclusion

Excluding CACC areas, the KIOP MLE Proposal will impact a total of 1,612 ha of vegetation (1,441 ha directly and 171 ha indirectly). This impact includes direct and indirect impact to habitat for all 27 Resident or Regular Visitor significant fauna species of the KIOP MLE New Disturbance Footprint, including five species that are listed under the BC Act or EPBC Act:

- Gilled Slender Blue-tongue (WA: VU).
- Malleefowl (WA: VU; EPBC: VU).
- Ornate Trapdoor Spider (WA: EN).
- Southern Whiteface (WA: VU; EPBC: VU).
- Western Spiny-tailed Skink (WA: VU; EPBC: EN).

The assessment against the residual impact significance model found that residual impacts to the following six species are significant or potentially significant and will / may require an offset:

- Significant residual impact that will require an offset:
    - Gilled Slender Blue-tongue (WA: VU).
    - Malleefowl (WA: VU; EPBC: VU).
    - Western Spiny-tailed Skink (WA: VU; EPBC: EN).
- Potentially significant residual impact that may require an offset:
    - Long-tailed Dunnart (WA: Priority (P) 4).
    - Karara Millipede (*Antichiropus* sp. nov. 'Karara').
    - Mt Gairdner Scorpion (*Urodacus* sp. nov. 'Mt Gairdner').

The predicted impacts to the remaining 21 significant fauna species are unlikely to be significant. Mitigation measures such as control of feral predators, establishing effect rehabilitation and others as discussed in **Section 5.2** and **Section 5.3** may partly mitigate the local impact to the species and facilitate medium to long term recolonisation. Residual impacts to these 21 species are unlikely to result in a change in the State or Commonwealth conservation status, or result in the species being listed at State or Commonwealth level.

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Appendix A

KML Environmental Procedure - Malleefowl Management and Monitoring

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KARARA MINING LTD

Karara Corporate Standard

Environmental Procedure - Malleefowl Management and Monitoring

CORP-EN-PRO-1035

12-Apr-22

SYNOPSIS

This 'Environmental Procedure - Malleefowl Management and Monitoring' forms part of Karara Mining Limited Corporate Standards and describes the procedures specification that shall be used for all works within Karara Mining Limited.

Disclaimer
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CORP-EN-PRO-1035 - KARARA CORPORATE STANDARD

REV	DESCRIPTION	ORIG	REVIEW	APPROVER	DATE
5	Re-Issued for use	M Chen	A Marais	G Trench	12-Apr-22

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1 PURPOSE & SCOPE

The purpose of this procedure is to minimise, to as low as reasonably practicable, the impact of the Greater Karara Project (the Project) activities on Malleefowl (*Leipoa ocellata*) by identifying and implementing a range of management and monitoring measures. These measures have taken into account the objectives of the National Recovery Plan for Malleefowl (Benshemesh, 2007) and the National Malleefowl Monitoring Manual (National Malleefowl Recovery Team, 2019).

The Project consists of the Karara Iron Ore Project (KIOP), Mungada Iron Ore Project (MIOP), Hinge Iron Ore Project (HIOP), and includes all exploration, mining and processing activities undertaken by KML, along with associated linear infrastructure including haul roads, railway, the 330kV transmission line, and raw water pipeline.. This procedure applies to all elements and stages of the Project that may impact on Malleefowl. Information on Malleefowl biology as relevant to the Project is included in Appendix A. This procedure is an approved document prepared to satisfy the requirements of:

- Condition 2 of EPBC 2006/3017, approved under the *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

In addition, this document provides direction with respect to the following ministerial statements under the *Environmental Protection Act 1986* (EP Act):

- Condition 10 (Fauna Mortality Register) of Ministerial Statement 805 (Karara Iron Ore Project); and
- Conditions 9 (Fauna Mortality Register) of Ministerial Statement 806 (Mungada Iron Ore Project).

Karara Mining Limited (KML) is committed to continual improvement and has implemented an adaptive approach to managing its potential impact on Malleefowl. This procedure will be reviewed and amended based on the outcomes of monitoring and the findings of any incident investigations; or otherwise every 2 years. Any substantial changes to the intent of the procedure or management controls, resulting in any new or increased impacts on Malleefowl, are required to be reviewed and approved by the Department of Biodiversity, Conservation and Attractions (DBCA) and the Department of the Agriculture, Water and the Environment (DAWE) to satisfy conditions of federal approval EPBC 2006/3017.

1.1 Objectives

The objectives of this procedure are to:

- Identify relevant legal obligations in relation to Malleefowl management and how these are achieved;
- Define and implement a methodology to manage and monitor any potential impact on the Malleefowl; and
- Detail a methodology by which Malleefowl surveys and monitoring are to be undertaken.

This procedure supports the KML Environmental Management Plan CORP-EN-PLN-1020 (EMP) and KML Environmental Plan – Fauna Management CORP-ENV-PLN-1008 and the Environmental Procedure – Terrestrial Fauna Management (CORP-EN-PRO-1010). Compliance with this procedure and the requirements of the EMP is mandatory.

2 DEFINITIONS

Table 1: Definitions

Term	Definition
Active Malleefowl Mound	A mound that almost certainly contains eggs
BC Act	*Biodiversity and Conservation Act 2016*
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DMIRS	Department of Mines, Industry Regulation and Safety
EMP	Environmental Management Plan
EMS	Environmental Management System
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GD	Ground Disturbance
GIS	Geographic Information System
KML	Karara Mining Limited
MS805	Ministerial Statement 805
MS806	Ministerial Statement 806
PER	Public Environmental Review
POW	Program of Works
SWP	Safe Work Procedure
the Project	Being the Greater Karara Project, all mining and processing activities undertaken by KML, along with associated linear infrastructure including haul roads, railway, the 330kV transmission line and raw water pipeline.
WA	Western Australia
WAM	Western Australian Museum

3 PLANNING

3.1 Legal and Other Requirements

This procedure is designed to meet all commitments, legal requirements and the expectations of external stakeholders made for the Project. The relevant Commonwealth and State legislation to this Malleefowl Management and Monitoring Procedure are summarised below:

- *Animal Welfare Act 2002 (WA)*
- *Biodiversity Conservation Act 2016 (WA)*
- *Biodiversity and Conservation Regulations 2018*
- *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
- *Environmental Protection Act 1986 (WA)*
- *Mining Act 1978 (WA)*

In addition to these Acts, commitments made in the KML Public Environmental Review (PER) have been considered during the development of this procedure.

The Malleefowl is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is listed as 'Vulnerable' under the Western Australian *Biodiversity and Conservation Act 2016* (BC Act).

In 2009, KML obtained federal approval under the EPBC Act (EPBC Approval number 2006 / 3017) to undertake activities associated with the Project. Condition 2 of 2006/3017 provides specific management measures associated with Malleefowl.

3.1.1 Licences and Permits

KML shall obtain an Authorisation to take or disturb threatened fauna under Section 40 of the BC Act through the Department of Biodiversity Conservation and Attractions (DBCA, formerly Department of Parks and Wildlife) in order to carry out disturbance activities that may impact Malleefowl.

The KML Environmental Department will maintain the details for any KML authorised persons approved in the handling of Malleefowl and Malleefowl eggs in the KML Environmental Management System (EMS).

3.1.2 Exploration Activities

For proposed exploration programs, the tenement condition to provide information on proposals which may disturb any declared rare or geographically restricted fauna applies.

KML has developed and implemented an overarching Exploration Environmental Management Plan CORP-EN-PLN-1002 which has been endorsed by DBCA and states that prior to the lodgement of an Exploration Program of Work (POW), KML will address the conservation impacts of the proposed activities on Malleefowl through the Environmental Procedure – Information to Support Environmental Assessment of Exploration POW CORP-EN-PRO-1041. This information will be submitted to DBCA for review and assessment via the Environmental Form - Information to Support Environmental Assessment of Exploration POWs CORP-EN-FRM-1059.

DBCA's acceptance of the POW will be provided to the Department of Mines, Industry Regulations and Safety (DMIRS) for consequent approval of the POW with any additional conditions attached.

3.2 Roles and Responsibilities

Table 2 provides a summary of the roles and responsibilities to ensure compliance in the implementation of this procedure. The main body of the procedure should be referred to where clarification is required.

Table 2: KML Roles and Responsibilities

Relevant Role	Responsibility
KML *Manager Environment*	• Overall responsibility for development, implementation, maintenance and compliance with this procedure, • Report to Senior Management on matters of environmental compliance and legal requirements, • Facilitate environmental auditing and compliance monitoring as required.
KML *Environment Department / in conjunction with fauna specialist*	• Provide environmental advice and assistance to all personnel as required; • Coordinate the delivery of environmental training to key personnel;

Relevant Role	Responsibility
	• Implement monitoring programs and maintain records and registers related to such programs; • Conduct surveys in proposed disturbance areas, prior to the activity, to identify Malleefowl mounds; • Determine if GD will impact on Malleefowl and in the event that GD will impact an active Mound, liaise with DBCA for course of action; • Obtain relevant licences related to Malleefowl management and report any non-compliance of licence conditions; • Compile and report on licences compliance, management and interactions related to Malleefowl; • Liaise with DBCA and stakeholders for egg removal. DBCA will be responsible for the welfare of the eggs and chicks once handed over by KML; • Where there are repeat Malleefowl mortalities, investigate and implement mitigation measures in consultation with DBCA; • Report all Malleefowl mortalities, injuries or unauthorised disturbance to Malleefowl mounds to the DBCA Geraldton District office within 72 hours of the incident being reported internally and to the DAWE within seven days; • Submit any substantial changes to the intent of the procedure or management controls, resulting in any new or increased impacts on Malleefowl to the Minister for the Environment for Approval; and • Submit any variation to this procedure to DAWE and DBCA for their records.

Relevant Role	Responsibility
All KML Employees and Contractors	• All personnel shall take all necessary measures outlined in this procedure to ensure compliance with this procedure; • Employees and Personnel shall not interfere with native animals, feed feral animals, or bring domestic pets, off-road recreational vehicles or firearms to any Project area; • Report all sightings of Malleefowl and/or Malleefowl mounds to the KML Environment Department using the Environmental Form - Fauna Sighting, Relocation and Mortality CORP-EN-FRM-1045; and • Report Malleefowl injuries, mortalities, and unauthorised disturbance to Malleefowl mounds to the KML Environment Department in accordance to the Safety Procedure – Incident Management CORP-HS-PRO-1046.

3.3 Competence, Training and Awareness

In accordance with the Safety Procedure – HSE Training and Induction CORP-HS-PRO-1001, all KML Personnel, Contractors and Sub-Contractors must undertake the mandatory inductions prior to commencing work on site. The induction provides a brief overview of Malleefowl management on site and includes, but not limited to, the following information:

- Photographs and description of the Malleefowl, including appearance and conservation status;
- All native animals are not to be interfered with and Malleefowl mound is not to be disturbed unless authorised under a Ground Disturbance (GD) permit;
- All Malleefowl injuries, mortalities and unauthorised disturbance to mound must be reported as an incident to the KML Environmental Department;
- Speed limits and road signage must be complied with, traffic is restricted to designated roads, off-road driving is prohibited and entry is restricted to areas of significant habitat;

- Feral animals are managed under the Environmental Plan – Feral Animal Management CORP-EN-PLN-1009 and must not be encouraged through feeding, incorrect waste disposal, access to artificial water bodies, or be brought to site;
- Housekeeping must be maintained at a high standard;
- All feral animal sightings (cats, goats, foxes) are to be reported to the KML Environmental Department; and
- Information on Malleefowl mounds and locations will be included in toolbox meetings and educational posters will be displayed around site.
- Any personnel handling Malleefowl or their eggs shall have the appropriate licence and be suitably trained to handle fauna.

An environmental training matrix is maintained and KML's online training management system (InTuition) ensures KML employee and contractor induction and training requirements are maintained and follow up inductions conducted every second year to ensure ongoing compliance with the EMP.

4 IMPLEMENTATION AND OPERATION

The following management measures have been implemented by KML to avoid and/or minimise impacts to Malleefowl.

4.1 Approvals Request and Ground Disturbance Permits

Impacts to Malleefowl habitats is managed and minimised through the implementation of the KML Environmental Procedure - Approvals Request and Ground Disturbance CORP-EN-PRO-1004 and the associated GD permitting requirements.

Prior to ground disturbance, and as required by the KML Environmental Procedure - Approvals Request and Ground Disturbance CORP-EN-PRO-1004, a desktop review will be conducted to ensure all proposed disturbance areas are assessed for prospective Malleefowl habitat. Any gaps in the assessment information will be addressed prior to ground disturbance commencing.

4.1.1 Ground Disturbance Inspections and Permits

Once the GD permit is issued but prior to ground disturbance commencing a field inspection will be conducted to ensure the conditions of the GD are being followed. Information collected during this inspection will be recorded on the KML Environmental Form – Pre-Ground Disturbance Inspection CORP-EN-FRM-1027.

The Environmental Form - Ground Disturbance Release CORP-EN-FRM-1014 must be completed, understood and signed off by personnel listed on the form prior to disturbance commencing under the GD Permit.

The Environmental Form - Post Ground Disturbance Inspection CORP-EN-FRM-1015 is also completed by the KML Environmental Department following disturbance to determine if disturbance has been carried out in accordance with the GD permitting requirements and to ensure there has been no unauthorised disturbance to Malleefowl habitat. Any non-compliance will be reported as an environmental incident and managed through the Safety Procedure - Incident Reporting and Analysis CORP-HS-PRO-1018.

Progressive rehabilitation has also been implemented in accordance with KML's Environmental Procedure – Land Rehabilitation CORP-EN-PRO-1002 to minimise potential impact on Malleefowl and their habitat due to clearing.

4.2 Feral Animal Management

KML's Environmental Procedure - Feral Animal Management and Monitoring CORP-EN-PRO-1050 and associated monitoring and abatement procedures have been implemented to reduce feral animal impact on the Malleefowl. All site personnel (including contractors) are inducted not to feed feral animals or bring domestic pets to site and ensure waste is disposed of correctly to discourage feral animal at site.

4.3 Traffic and Lighting Management

KML's Safety Plan - Traffic Management CORP-HS-PLN-1008 and associated control measures (i.e. reduced speed limit signage or "no-go" zones where Malleefowl are known to exist) are in place to prevent Malleefowl strikes.

Temporary and permanent lighting installed on infrastructure is placed to minimise light overspill, particularly into surrounding vegetated areas, to ensure Malleefowl are not deterred from roosting near lit areas, and to minimise the risk of predation.

4.4 Reporting of Sighting, Injuries and Deaths of Malleefowl

Malleefowl training and awareness programs have been implemented for staff and contractors, through site inductions, awareness presentations and educational posters. All KML staff and contractors are aware of their responsibility for reporting sightings of Malleefowl and/or Malleefowl mounds to the KML Environment Department using the Environmental Form - Fauna Sighting Relocation and Mortality CORP-EN-FRM-1045.

All KML staff and contractors are aware of their responsibility to report Malleefowl injuries or mortalities to the Environmental Department in accordance with the Safety Procedure – Incident Management CORP-HS-PRO-1046. KML Environmental Department records all Malleefowl injuries or mortalities on a Fauna Mortality Register in accordance with Condition 10 of MS805 and Condition 9 of MS806.

4.5 Avoidance Controls

Where work is to take place near an active mound KML will ensure that:

- Active Malleefowl mounds located inside or within **10m** of a GD boundary, shall be flagged (red and white) in the field as avoidance sites.

- Where practicable, plant and equipment shall maintain a **50m** buffer from active mounds through demarcation of the mound in the field as per the GD permit. If this buffer cannot be achieved a spotter shall be allocated. This is the responsibility of the GD permit holder.
- If plant and equipment need to tram past an active mound, the KML Environment Department shall be notified and a spotter must be used during the activity to ensure no disturbance to the mound.
- Unauthorised personnel shall not enter the 50m buffer around active Malleefowl mounds and limit the period of time spent near the mound by undertaking work as quickly as practicable.
- If Malleefowl mounds are identified during the desktop review, additional inspections are undertaken to determine the status of the mound(s) and whether or not they contain eggs as part of the Pre-Ground Disturbance Inspection before a GD release is issued.
- Where active Malleefowl mounds exist in areas of proposed disturbance, clearing will be taken outside of breeding season (1st September – 30th April) where practicable.
- If the mound does contain eggs then the work **must be postponed** until the mound is no longer incubating eggs or the eggs have been removed.

There are no buffer requirements around inactive Malleefowl mounds; however they must remain undisturbed unless prior approval has been sought from the KML Environment Department.

4.6 Avoidance Constraints

The Project has been designed to minimise disturbance as much as practicable, and to minimise impacts to the surrounding environment. Where active mounds inside the disturbance footprint cannot be avoided and will be either directly or indirectly impacted, KML will contact DBCA to coordinate mound excavation and appropriate collection, incubation and transport of chicks and eggs.

5 SALVAGING

5.1 Egg Removal

KML shall maintain a BC Act Authorisation for works associated with the Project for the purposes of mound removal.

When a mound has been approved for removal, prior to disturbance it must be checked for the presence of eggs. If eggs are present and the mound cannot be avoided until hatching occurs they will be salvaged. Egg removal can only be undertaken under BC Act Authorisation in accordance with the following process outlined in this section.

5.1.1 Prior to disturbing the Malleefowl mound

- Contact DBCA to notify them that egg removal will be undertaken.
- Ensure the incubators are clean and at temperature, refer Section 5.1.5.
- Transport routes are clearly identified and communicated, all equipment is on hand and all personnel are clear on roles and responsibilities.

5.1.2 Opening the Malleefowl Mound

- Open the mound early in the day following the natural work regime of the birds (Van der Waag, 2009).
- Two people shall be located on opposite sides of the mound, minimising pressure on the centre of the mound.
- Gently scoop the sand outwards with hands only until the eggs are exposed.
- Lightweight gloves will reduce the risk of minor scratches. Heavy duty gloves should not be used because they will reduce the sensitivity of the searching process.

***N.B.** It is important that the eggs remain upright, at all times, from the moment they are removed from the mound until hatching.*

5.1.3 Label Egg and Record Information

- Using a soft pencil only, place an arrow pointing to the top of the egg. The egg must remain with the arrow facing upward at all times during the salvage process
- Ensure movement of the eggs is minimised as much as possible.

- Clearly label any eggs collected from the mound with the mound identification number, sourced from KML GIS data, the egg number (e.g. 1, 2 or 3 etc. depending on the sequence the eggs are removed from the mound), and current date e.g. MFM110_1_25/11/2019).
- Record on the KML Environmental Form – Malleefowl Egg Data Record Sheet CORP-EN-FRM-1025 the following for each egg removed; weight (grams) and the length and width of each egg using callipers to the nearest 0.1mm.

5.1.4 Egg Transfer and Storage

- For each egg, once all data has been collected, place the eggs into stubby holders and put into an esky lined with a blanket, or other insulation material.
- The egg must remain with the arrow facing upward at all times during the salvage process.
- Ensure material is packed between the eggs, with a blanket placed over the top of all of the eggs.
- Once the eggs are carefully packed and secured in the vehicle, they should be immediately transported to the incubator. For longer distances monitor the temperature of the box to ensure a constant 32-34°C is maintained.
- Transfer the eggs to the incubating facility as soon as possible following removal from the mound. Never leave eggs on vehicle seats or in direct sunlight or anywhere they are at risk of damage. Ensure eggs are secured appropriately within the vehicle in which they will be travelling.
- Vehicles containing eggs must be driven extremely carefully to the KML incubation facility. All efforts must be made to prevent damage to the eggs during transfer to the incubator.
- DBCA must be informed that eggs/ chicks are ready for collection from site. Liaison with DBCA is required to organise collection logistics.
- Malleefowl egg data sheets must be duplicated and a copy supplied to DBCA on collection of eggs/chicks.

5.1.5 Malleefowl Egg Incubation

KML have been advised by DBCA that they are able to collect eggs and or chicks from site between 1-2 weeks of being informed that eggs have been salvaged. KML must therefore incubate and manage the eggs and any hatched chicks until collected by DBCA. Equipment required to transport incubated eggs and chicks from site will be provided by DBCA.

It is important the incubator remains as clean and hygienic as possible during egg incubation and hatching. Prior to initial use of the incubator, ensure the equipment is cleaned thoroughly with a suitable antibacterial wash, or vinegar as an alternative. Once rinsed and dried the incubator can be set up for use.

- Refer to the incubator user guide for initial set up and temperature setting. It may take several hours for the incubator to reach optimum temperature for egg incubation, so ensure the unit is turned on well before use.
- Carefully place the salvaged eggs into the incubator, ensuring they remain secure in each stubby holder. The stubby holders containing eggs should be placed on petri dishes within the incubator, to collect any fluid during hatching. Any soiling of the incubator should be cleaned up with a clean cloth soaked in antibacterial solution, and then washed with distilled water.
- The incubator should be maintained at 32.5-34.5°C and checked at least twice (2) a day to ensure temperature maintenance, and three (3) times a day when chicks are expected. Incubation period for a newly laid egg is approximately 60 days.
- Ensure the humidity is maintained as high as possible within the incubator by keeping the water reservoir full of distilled water. The water should be replaced every time the incubator is opened.
- The incubation period of each egg will depend on the age of the egg when removed from the mound. Malleefowl eggs are thin-shelled and pale pink in colour, and will change to dark beige during the incubation period.
- Disturbance to eggs should be kept to a minimum at all times.

5.1.6 Malleefowl Chick Care

- When an egg starts the hatching process, cover the incubator with a towel to create a dark environment internally.

- Once hatched, the chick should be left in its stubby holder in the incubator until the head is dry and fluffy (approximately 5 hours from first emergence). See below Figure 1 Chick Hatching and Drying.

Figure 1: Chick Hatching and Drying (Van der Waag, 2009)

- The chick can then be removed from the stubby holder. Wipe an area down with antibacterial solution and place a paper towel down for the chick to stand on when removed from the stubby holder. Most chicks will make their own way out of the stubby holder when held horizontal; however, if the chick does not emerge on its own, the stubby holder can be gently cut to remove the chick. **The chick's body will still be wet, so work quickly so it doesn't chill**.
- It may be necessary to cut the umbilical cord. If this is required, use medical scissors cleaned with an antibacterial wipe and cut the cord a few centimetres from the chick's body. Once cut, squirt the navel with a small amount of Betadine to minimise the risk of infection.
- Place the chick into a warm insulated box to continue to dry off. The box should be maintained at about 30°C, internal temperature. See Figure 2 below.

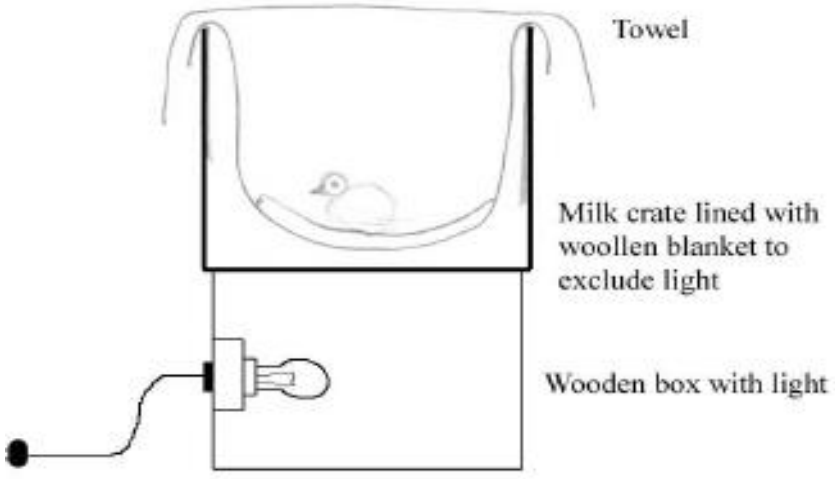


Figure 2: Insulated Box Layout (Van der Waag, 2009)

- Once the chick is dry, turn off the heat source and allow to remain in the box for another one hour prior to removal.
- The chick can be held in a temporary pen in a quiet, indoor location until collection by DBCA. The pen can be set up as shown in Figure 3 below. A 1x1x1m cardboard box lined with newspaper is ideal. Ensure a shallow dish of water and some turkey crumbles (chick food) are provided. Provide a branch for shelter. **No heat source is required from this stage**.

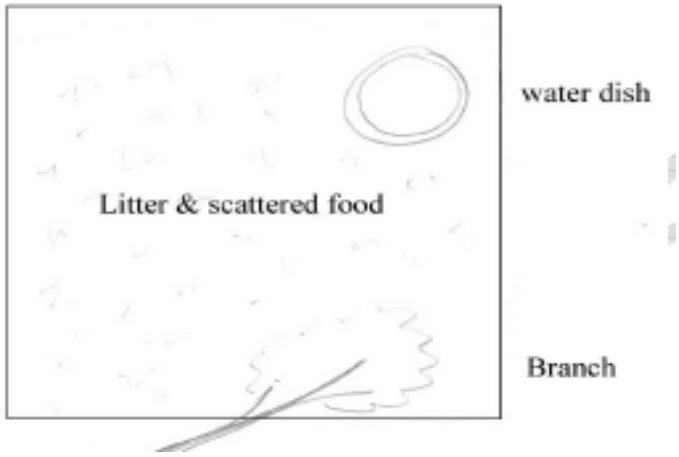


Figure 3: Litter and Scattered Food (Van der Waag, 2009)

N.B. **In the wild, Malleefowl chicks must fend for themselves as soon as they hatch and emerge from the mound. The adult Malleefowl do not care for the chicks once hatched.**

Once the eggs or chicks have been collected by DBCA or delegate, they will be responsible for the transport, release (including determining the release area) and post monitoring of the Malleefowl.

6 SURVEYS AND ANNUAL MONITORING

6.1 Malleefowl Baseline Surveys

Baseline Malleefowl mound surveys shall be undertaken for all areas of proposed disturbance to identify prospective habitat and determine the presence and status of any mounds within the area. Mounds are categorised in accordance with the Mound Profile details outlined in Section 6.2.1 of this procedure.

Surveys are conducted using a human chain method, as outlined in the *National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team 2019).

6.2 Annual Monitoring

Malleefowl monitoring shall be undertaken annually throughout the breeding season (being 1st September until 30th April) and all field information is to be recorded within KML's GIS system by using the Environmental Form – Malleefowl Mound Monitoring – Field Sheet CORP-EN-FRM-1031.

Monitoring shall be undertaken in accordance with KML's Safe Work Procedure Malleefowl Mound Monitoring EN-SWP-043

KML uses the *National Malleefowl Monitoring Manual* (National Malleefowl Recovery Team 2019) as a guide to define the monitoring programme. The Project has defined the monitoring programme as follows:

- All known active or recently active mounds should be visited every year.
- Mounds that have not been active for at least 5 years will only be monitored every 5 years.
- Old or Very Old mounds as defined in Table 3 shall be assessed opportunistically and not required to be monitored regularly.

Monitoring priority will be placed on mounds located in close proximity to activity or infrastructure.

Additionally, opportunistic observational records of Malleefowl and mounds are recorded by KML employees and contractors on the Environmental Form – Fauna Sighting, Relocation and Mortality CORP-EN-FRM-1045.

6.2.1 Mound Profile

The mound profile describes the appearance of the mound, which changes with breeding activity (erosion and vegetation growth) and age. Mound profiles can be described as follows (Figure 4);

Profile 1: Typical crater with raised rims. This is the typical shape of an inactive mound. However the mound can also be active and open.

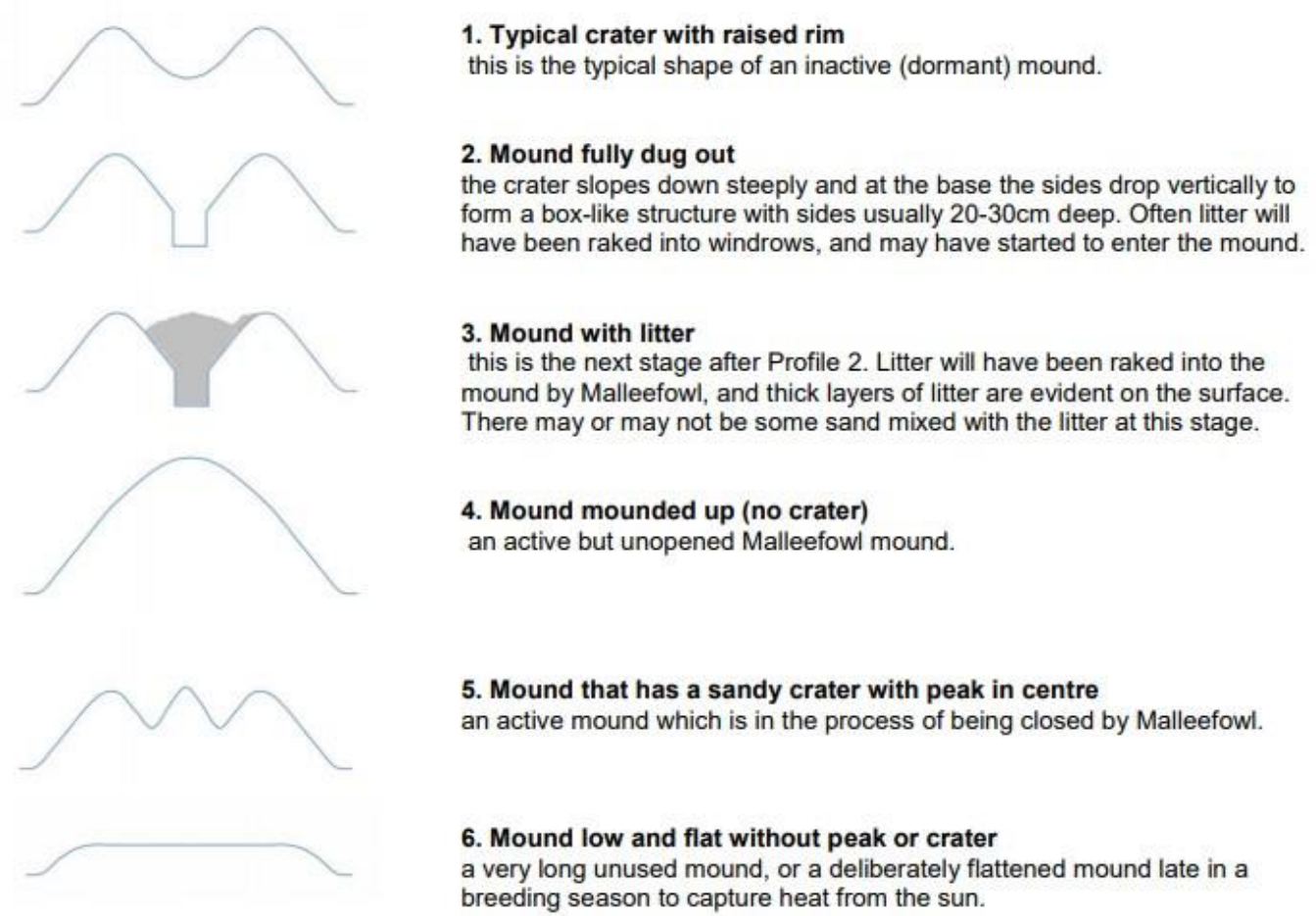
Profile 2: Mound fully dug out. The characteristic of this profile is that the crater slopes down steeply, and at the base the sides drop vertically to form a box- like structure with side usually 20 to 30 cm deep. Often, litter will have been raked into windrows, and may have started to enter the mound.

Profile 3: Mound with litter. This is the next stage after profile 2. Litter will have been raked into the mound by Malleefowl, and thick layers of litter are evident on the surface. There may or may not be sand mixed with the litter at this stage.

Profile 4: Mound mounded up (no crater). This is the typical profile of an active but unopened Malleefowl mound. The active mound is closed and dome shaped.

Profile 5: Mound has a sandy crater with a peak in centre. This is a typical profile of an active mound which is in the process of being closed by Malleefowl.

Profile 6: Mound low and flat without peak or crater. This mound has not been used for some time and weathering and erosion have ‘flattened” the original mound. Pictures of each mound profile are below. Note that these are taken in sandy environments and mounds in the Karara area can look different.



1. Typical crater with raised rim
this is the typical shape of an inactive (dormant) mound.

2. Mound fully dug out
the crater slopes down steeply and at the base the sides drop vertically to form a box-like structure with sides usually 20-30cm deep. Often litter will have been raked into windrows, and may have started to enter the mound.

3. Mound with litter
this is the next stage after Profile 2. Litter will have been raked into the mound by Malleefowl, and thick layers of litter are evident on the surface. There may or may not be some sand mixed with the litter at this stage.

4. Mound mounded up (no crater)
an active but unopened Malleefowl mound.

5. Mound that has a sandy crater with peak in centre
an active mound which is in the process of being closed by Malleefowl.

6. Mound low and flat without peak or crater
a very long unused mound, or a deliberately flattened mound late in a breeding season to capture heat from the sun.

Figure 4: Diagrammatic view of Mound Profiles and descriptions **(National Malleefowl Recovery Team 2019).**

Profile 1 Mound

Profile 2 Mound

Profile 3 Mound

Profile 4 Mound

Profile 5 Mound

Profile 6 Mound

(Pictures from the National Manual for the Malleefowl Monitoring System and J. Turpin)

Figure 5: Photographic examples of Mound Profiles **(National Malleefowl Recovery Team 2019).**

6.2.2 Mound Status

Mounds are recorded as either Active or Inactive based on Table 3. Active mounds are those that are currently being used by Malleefowl as an incubator for their eggs, or are likely to contain eggs. Mounds that have obvious signs of Malleefowl, such as scats, litter trails, tracks or scratchings are not recorded as active. .

Table 3: Description of Malleefowl mound status to determine Active or Inactive

Mound Status	Status Description
Active	(Profile 4): Mound almost certainly contains eggs. Mound is covered over, dome-shaped and surface is freshly disturbed (that day), often with small excavations around the lower perimeter where the male has scratched material onto the centre of the mound. There will be no ant-line tracks and very few tracks of small animals present, as the surface of the mound is being worked constantly.
Inactive	(Profile 4): Mound is covered over and dome-shaped, but surface is not disturbed, having assorted animal tracks and ant-lion traps on it. This is a mound that has been fully-prepared for incubation in that year, but has been abandoned. Note that it may also have been prepared in an earlier year but this will have been recorded previously.
Inactive	(Profile 3 or 5): Mound has been excavated and filled with leaf-litter, but has been abandoned.
Inactive	(Profile 1 or 2): Mound has been excavated but no further progress has been made.
Inactive	(Profile 1 or 6): No recent activity. Profile 1 and 6 grade into each other, but mounds can be roughly aged (i.e. time since last used) by their appearance. For example • **Recently Used:** Eggshell and plant material in centre still present. It is not known how long it takes for such material to degenerate in the Karara region, but such a mound could be >5 years old. If very young, the plant material in the centre is like compost, may contain beetle larvae and termites, and may be excavated by foraging goannas and echidnas.

Mound Status	Status Description
	• **Not Recently Used:** No eggshell or plant material in centre, but central depression still well-formed, crater still distinct, with central depression often lower than the surrounding soil surface. Such mounds may be decades old. One that has been observed annually for five years has not changed in appearance at all. Weathering of such mounds and colonisation by plants may be very slow except after rare heavy rainfall events • **Old:** Clearly weathered by still distinctly Profile 1. Often with small plants in the centre, and probably several decades old or older. • **Very Old:** Profile 6 or still with a hint of Profile 1. The age of such mounds may be in the order of 50 to 500 years. Shrubs and even trees may be present

6.2.3 Additional information

Additional information shall be recorded on Environmental Form – Malleefowl Mound Monitoring – Field Sheet CORP-EN-FRM-1031 during the field monitoring, and includes;

- Whether or not the mound has been recently scratched;
- Whether or not egg shell is visible on the mound;
- Signs of animal activity such as tracks or scats;,
- The amount and type of vegetation growing around or on the mound; and
- The status of the crossed sticks placed during the previous monitoring visit. These sticks are placed in a cross on an inactive mound and help to indicate whether or not the mound has been worked on by a Malleefowl between monitoring events.

7 CHECKING

7.1 Incident Reporting

All Malleefowl injuries, mortalities and unauthorised disturbance to mounds will be reported to the KML Environment Department as an incident report and shall include the following information:

- Injury / mortality / disturbance date and time;
- Reported by;
- Area of injury / mortality / disturbance;
- Location of injury / mortality / disturbance (easting and northing);
- Number of birds, and whether they are injured or dead;
- Cause/ Nature of injury / mortality / disturbance;
- Any predators sighted in the area; and
- Any additional comments.

Incidents are documented and investigated in accordance to the Safety Procedure – Incident Management CORP-HS-PRO-1046. All injuries to Malleefowl or unauthorised disturbance to Malleefowl mounds will be reported to the DBCA Geraldton District office within 72 hours or as soon as practicable and to DAWE within seven days. Deceased Malleefowl will be recovered, frozen and given to the Malleefowl Preservation Group, DBCA or the WA Museum (WAM) to contribute towards ongoing research, on request.

Should repeated mortalities of Malleefowl occur, mitigation measures will be investigated and implemented in consultation with the DBCA Mid-West Regional personnel.

Disciplinary action will be taken if employees and contractors are found to be deliberately interfering with Malleefowl.

Any incidents that occur during the egg salvage and management program, including egg breakage, injury or death of Malleefowl, must also be reported via this process.

7.2 Control of Records

All data collected during baseline surveys is recorded and maintained as per the Environmental Procedure – Environmental and Heritage Data Management CORP-EN-PRO-1045.

Annual monitoring data is recorded and maintained in the KML Malleefowl Register (Master Tab) found in the KML EMS and is managed by the site Environment Department. Data is reviewed and analysed during the monthly desktop review and uploaded to GIS as per the following:

- GIS Coordinator checks the Masters Tab monthly for new Malleefowl mounds and adds new mounds to the database;
- Selected mounds are monitored annually;
- Any status changes found during the monitoring process are recorded in the register;
- Site Environment team notify GIS Specialist of any changes to status, including if a mound is removed, via email as changes are detected; and
- If a mound inspected during GD pre-release is found to be active, notify GIS via email.

7.3 Reporting

Fauna Returns are to be submitted annually to DBCA as per specific conditions as dictated by the relevant licences. Annual reporting will be carried out as follows:

- Malleefowl injuries, deaths and relocations will be reported to the DBCA within 72 hours and DAWE within seven days of the incident being reported internally, and to the DAWE in the EPBC Annual Environmental Report;
- The number of Malleefowl eggs and chicks that have been handed to DBCA and any incidents that occur through the egg salvage and management process will be reported to DBCA and DAWE in the EPBC Annual Environmental Report;
- Unauthorised disturbance to Malleefowl mounds will be reported to the DBCA and DAWE in the EPBC Annual Environmental Report.
- All sightings of Malleefowl and/or Malleefowl mounds will be reported to DAWE and DBCA Regional Department on an annual basis, via the EPBC Annual Environmental Report.

7.4 Review

Karara Mining Limited (KML) is committed to continual improvement and has implemented an adaptive approach to managing its potential impact on Malleefowl. This procedure will be reviewed and amended based on the outcomes of monitoring and the findings of any incident

investigations; or otherwise every two years. Any substantial changes to the intent of the procedure or management controls, resulting in any new or increased impacts on Malleefowl, are required to be reviewed and approved by the DBCA and the DAWE to satisfy conditions of federal approval EPBC 2006/3017 for the Project.

8 DOCUMENT LIST

The documents referred to in this procedure are listed in the table below.

Table 4: Document List

Document Title	KML Document Number
Environmental Form - Malleefowl Egg Data Record Sheet	CORP-EN-FRM-1025
Environmental Form – Malleefowl Mound Monitoring – Field Sheet	CORP-EN-FRM-1031
Environmental Form – Fauna Sighting Relocation and Mortality	CORP-EN-FRM-1045
Safety Procedure - HSE Training and Induction	CORP-HS-PRO-1001
Safety Plan – Traffic Management	CORP-HS-PLN-1008
Safety Procedure – Incident Reporting and Analysis	CORP-HS-PRO-1046
Environmental Procedure – Approvals Request and Ground Disturbance	CORP-EN-PRO-1004
Environmental Procedure – Environmental and Heritage Data Management	CORP-EN-PRO-1045
Environmental Procedure – Land Rehabilitation	CORP-EN-PRO-1002
Environmental Procedure– Feral Animal Management and Monitoring	CORP-EN-PRO-1050
Environmental Plan – Fauna Management	CORP-EN-PLN-1008
Environmental Plan – Environmental Management Plan	CORP-EN-PLN-1020
Environmental Plan – Exploration Environmental Management Plan	CORP-EN-PLN-1002

9 REFERENCES

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APPENDIX A: MALLEEFOWL BIOLOGY

In Western Australia Malleefowl occur mainly in scrubs and thickets of Mallee (*Eucalyptus spp.*), Acacia (particularly *Acacia ramulosa var. linophylla*), Boree (*Melaleuca lanceolata*) and other dense litter-forming shrublands including Mulga (*Acacia aneura*) shrublands (Johnstone & Storr in Turpin & Bamford). They also occur in mixed shrublands and Tammar *Allocasuarina acuminata* shrublands (M. Bamford pers. obs). In the Karara area, they appear to concentrate on the lower slopes of the hills (within dense Acacia shrublands), particularly for mound construction. The species' distribution was once larger and less fragmented, but the widespread clearing of suitable habitat, coupled with the degradation of habitat by fire and livestock and predation by foxes have reduced Malleefowl numbers considerably.

The EPBC Act lists Malleefowl as a migratory species, although they are usually sedentary with an average home range area of 1.7 to 4.6 km². Dispersal of many kilometres has been recorded, but true migration has not been observed (Marchant and Higgins 1993).

Malleefowl have developed a highly sophisticated method of temperature control for egg incubation. This species constructs distinctive nests that comprise a large mound covering a central core of leaf litter. The mound is constructed out of sand, pebbles or small rocks, depending on the habitat available. Mounds have a large central depression which is filled with leaf litter and covered with soil. Eggs are laid within the mound, buried and left to incubate by the heat generated from decomposing leaf litter (Malleefowl Preservation Group, 2008). An adult pair maintains the mound temperature of 32 – 34 degrees Celsius by adjusting soil cover to either retain or expel heat from the egg chamber (Malleefowl Preservation Group, 2008).

Malleefowl are generally monogamous with pair bonds maintained for life (Priddel & Wheeler, in Turpin & Bamford, 2008). The lifespan of the Malleefowl is unknown but studies have not recorded an individual breeding beyond 12 years (DPaW, 2009). Established pairs generally breed annually with mounds constructed as early as May and maintained until as late as March the following year. The male starts to open up the mound and collect leaf litter in May, but this may not start until June or July if the first rains are late. Eggs are laid around September, when the mound is fully prepared and producing warmth from decomposing litter. The mound is maintained to incubate the eggs until February, but activity sometimes continues until March.

The number of eggs laid by the female is low in some years, dependent upon conditions. The average clutch size is 16 (but may range from 5 to 30) and the incubation period lasts for between 62 and 64 days (DPaW, 2009). Malleefowl chicks receive no parental care and as a result chick mortality is high due to predation and exposure (DPaW, 2009).

Malleefowl mounds vary in size and diameter, depending on age and activity, however mounds commonly span more than five metres and are up to one metre high (DPaW, 2009). A pair of Malleefowl will often use the same mound over successive seasons; however nest fidelity is highly variable. Some Malleefowl pairs have been recorded using the same mound for up to nine years while others relocate seasonally between a cluster of two, three or four mounds (Priddel & Wheeler in Turpin & Bamford, 2008). The density of mounds is generally low. There may be as many as 11.1 active mounds / km², but in semi-arid areas such as the Karara project area, there is often 1 mound / km² or less (Marchant & Higgins in M. Bamford pers. comms).

Mound construction and breeding rely heavily on rainfall. Malleefowl have been recorded abandoning mound construction or failing to use a mound during seasons of low rainfall, including in the Karara area (Priddel & Wheeler in Turpin & Bamford, 2008). Breeding Malleefowl tend to be sedentary, as they nest and roost in the same area year after year. Breeding males do not stray far from the nest however birds may range over several kilometres outside the breeding season (DPaW, 2009). Malleefowl also require large amounts of leaf litter for egg incubation so are generally restricted to areas of dense vegetation that have not been burnt for many years.

The Malleefowl is currently the subject of a number of conservation initiatives both within Western Australia and Australia-wide. There is a high degree of coordination between the National Recovery Plan for Malleefowl and local activities by volunteer groups. Key stakeholders are:

- WA DBCA carries out re-introductions using eggs that are removed from areas where the species are abundant.
- Malleefowl Preservation Group is based in Ongerup, approximately 400km south east of Perth, where there is a Malleefowl centre. This group oversees a large amount of monitoring and survey work throughout southern WA using volunteers.
- North Central Malleefowl Preservation Group based in Wubin/ Dalwallinu. This group carries out some monitoring and survey work in its region.

WA Malleefowl Network is operated through the WWF and coordinates local activities by volunteers, including the implementation of national standards for survey work.

Appendix B

KML Environmental Procedure - Western Spiny Tailed Skink Management, Monitoring and Translocation

umwelt

KARARA MINING LTD

Karara Corporate Standard

Environmental Procedure - Western Spiny Tailed Skink Management, Monitoring and Translocation

CORP-EN-PRO-1024

12-Apr-22

SYNOPSIS

"This Environmental Procedure - Western Spiny Tailed Skink Management, Monitoring and Transnslocation Procedure forms part of Karara Mining Limited Corporate Standards and describes the procedures specification that shall be used for all works within Karara Mining Limited."

Disclaimer

CORP-EN-PRO-1024 - KARARA CORPORATE STANDARD

REV	DESCRIPTION	ORIG	REVIEW	APPROVER	DATE
B	Squad Check	K L'Estrange	R Houlihan	M Todd	25-Jun-12
0	Issued for use	K L'Estrange	L Purves	R Houlihan	26-Aug-13
1	Issued for use	K L'Estrange	L Purves	R Houlihan	26-Aug-13
2	Reissued for use	L Purves	J Sansom	R Houlihan	01-Oct-14
3	Reissued for use	J Baker	T Giltay	R Houlihan	14-July-15

4	Reissued for use	N Constable	C Courtauld	R Houlihan	18-Sept-17
5	Reissued for use	M Chen	A Marais	G Trench	12-Apr-22

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1 PURPOSE & SCOPE

The purpose of this procedure is to specify the requirements for the management, monitoring and translocation of Western Spiny-tailed Skink (WStS, *Egernia stokesii badia*) during the operations of the Greater Karara Iron Ore Project (the Project) in conjunction with the Karara Mining Limited (KML) Environmental Procedure – Terrestrial Fauna Management CORP-EN-PRO-1010.

The Project consists of all mining and processing activities undertaken by KML, along with associated linear infrastructure including haul roads, railway, the 330kV transmission line, and raw water pipeline.

Taking into account the objectives of the Action Plan for Australian Reptiles (Cogger et al, 1993) and the Western Spiny-tailed Skink (*Ergernia skokesii*) National Recovery Plan (DEC, 2012), this procedure is an approved document prepared to satisfy the requirements of:

- Condition 1 of EPBC 2006/3017, approved under the *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

  In addition, this document provides direction with respect to the following ministerial statements under the *Environmental Protection Act 1986* (EP Act):

- Condition 10 (Fauna Mortality Register) and 11 (Conservation Significant Reptiles) of Ministerial Statement 805 (Karara Iron Ore Project); and

- Conditions 9 (Fauna Mortality Register) and 10 (Conservation Significant Reptiles) of Ministerial Statement 806 (Mungada Iron Ore Project).

Karara Mining Limited (KML) is committed to continual improvement and has implemented an adaptive approach to managing its potential impact on WStS. This procedure will be reviewed and amended based on the outcomes of monitoring and the findings of any incident investigations; or otherwise every 2 years. Any substantial changes to the intent of the procedure or management controls, resulting in any new or increased impacts on WStS, are required to be reviewed and approved by the Department of Agriculture, Water and the Environment (DAWE) to satisfy conditions of federal approval EPBC 2006/3017.

1.1 Objectives

The objectives of this procedure are to:

- Identify relevant legal obligations in relation to WStS management and how these are achieved by KML at its operations;

- Define and implement a methodology to manage and monitor any potential impact on the WStS; and
- Detail a methodology by which WStS surveys, monitoring and translocations are to be undertaken.

This procedure supports the KML Environmental Management Plan (CORP-EN-PLN-1020) (EMP), Environmental Plan – Fauna Management (CORP-EN-PRO-1008) and the Environmental Procedure – Terrestrial Fauna Management (CORP-EN-PRO-1010). Compliance with this procedure and the requirements of the EMP is mandatory.

2 DEFINITIONS

Table 1: Terms of Reference

Term	Definition
BC Act	*Biodiversity and Conservation Act 2016*
BC Act Authority	Authorisation to take or disturb threatened fauna under Section 40 of the BC Act
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity Conservation and Attractions
DMIRS	Department of Mines, Industry Regulation and Safety
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic Information System
GD	Ground Disturbance
KIOP	Karara Iron Ore Project
KML	Karara Mining Limited
PER	Public Environmental Review
POW	Program of Works
The Project	Being the Greater Karara Project, all mining and processing activities undertaken by KML, along with associated linear infrastructure including haul roads, railway, the 330kV transmission line and raw water pipeline.
SEWPaC	Department of Sustainability, Environment, Water, Populations and Communities
Shall	Indicates a mandatory requirement that must be complied with
SWP	Safe Work Procedure
Translocation	Meaning to relocate Skinks from a location to be impacted by construction or operations, to an area of suitable nearby habitat, safe from disturbance by mining and associated operations
WA	Western Australia
WStS	Western Spiny-tailed Skink, *Egernia stokesii badia*

3 PLANNING

3.1 Legal and Other

The procedure is designed to meet all commitments, legal requirements and the expectations of external stakeholders made for the Project.

The relevant Commonwealth and State legislation to this Western Spiny-tailed Skink Management, Monitoring and Translocation Procedure are summarised below:

- *Animal Welfare Act 2002 (WA)*
- *Biodiversity Conservation Act 2016 (WA)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
- *Environmental Protection Act 1986 (WA)*
- *Mining Act 1978 (WA)*

In addition to these Acts, commitments made in the KML Public Environmental Review (PER) have been considered during the development of this procedure.

The WStS is listed as 'Endangered' under the EPBC Act and as 'Vulnerable' under the *Biodiversity Conservation Act 2016* (BC Act).

KML obtained federal approval under the EPBC Act (EPBC Approval number 2006 / 3017) to undertake activities associated with the Karara Iron Ore Project (KIOP). Condition 1 of 2006/3017 provides specific management measures associated with Western Spiny Tailed Skink.

KML will obtain an Authorisation to take or disturb threatened fauna under Section 40 of the BC Act through the Department of Biodiversity Conservation and Attractions (DBCA, formerly Department of Parks and Wildlife) in order to carry out disturbance activities that may impact WStS.

3.1.1 Exploration Activities

For proposed exploration programs, the tenement condition to provide information on proposals which may disturb any declared rare or geographically restricted fauna applies.

KML has developed and implemented an overarching Exploration Environmental Management Plan CORP-EN-PLN-1002 which has been endorsed by DBCA and states that prior to the lodgement of an Exploration Program of Work (POW), KML will address the conservation impacts of the proposed activities on WStS through the Environmental

Procedure – Information to Support Environmental Assessment of Exploration POWs CORP-EN-PRO-1041. This information will be submitted to DBCA for review and assessment via the Environmental Form - Information to Support Environmental Assessment of Exploration POWs CORP-EN-FRM-1059.

DBCA's acceptance of the POW will be provided to the Department of Mines, Industry Regulations and Safety (DMIRS) for consequent approval of the POW with any additional conditions attached.

3.2 Roles and Responsibilities

Table 2: Roles and Responsibilities

Role	Responsibility
KML Environmental Dept.	• Provide environmental advice and assistance to all personnel as required; • Coordinate the delivery of environmental training to key personnel; • Implement monitoring programs and maintain records and registers related to such programs; • Compile and report on licences, management and interactions related to WStS; and • Obtain relevant licences related to WStS management and report any noncompliance of licence conditions.
All KML Employees and Contractors	• All personnel shall take all necessary measures outlined in this procedure to ensure compliance with this procedure; • Employees and Personnel shall not interfere with native animals, feed feral animals, or bring domestic pets, off-road recreational vehicles or firearms to any Project area; and • Any conservation significant fauna sightings, fauna relocations or fauna mortalities shall be reported to the KML Environment Department immediately via the Environmental Form - Fauna Sightings and Mortality CORP-EN-FRM-1045.
KML Manager Environment & Communities	• Overall responsibility for development, implementation, maintenance and compliance with this procedure, • Report to Senior Management on matters of environmental compliance and legal requirements, • Facilitate environmental auditing and compliance monitoring as required.

3.3 Competence, Training and Awareness

In accordance with the Safety Procedure – HSE Training and Induction CORP-HS-PRO-1001, all KML Personnel, Contractors and Sub-Contractors must undertake the mandatory inductions prior to commencing work on site. The induction provides a brief overview of WStS management on site and includes, but not limited to, the following information:

- Photographs and description of the WStS, including appearance and conservation status;
- All native animals are not to be interfered with and WStS habitat is not to be disturbed unless authorised under a Ground Disturbance (GD) permit;
- All WStS injuries, mortalities and unauthorised disturbance to habitat must be reported as an incident to the KML Environmental Department;
- Speed limits and road signage must be complied with, traffic is restricted to designated roads, off-road driving is prohibited and entry is restricted to areas of significant habitat;
- Feral animals are managed under the Environmental Plan – Feral Animal Management CORP-EN-PLN-1009 and must not be encouraged through feeding, incorrect waste disposal, access to artificial water bodies, or be brought to site;
- Housekeeping must be maintained at a high standard;
- All feral animal sightings (cats, goats, foxes) are to be reported to the KML Environmental Department; and
- Information on WStS habitat and locations will be included in toolbox meetings and educational posters will be displayed around site.

Any personnel handling WStS during translocations shall have the appropriate licence and be suitably trained to handle fauna.

An environmental training matrix is maintained and KML's online training management system (InTuition) ensures KML employee and contractor induction and training requirements are maintained and follow up inductions conducted every second year to ensure ongoing compliance with the EMP.

4 IMPLEMENTATION AND OPERATION

To manage the potential impacts on WStS colonies and habitats, KML have developed and implemented the following measures.

4.1 Approvals Request and Ground Disturbance Permits

Impacts to WStS colonies and habitats is managed and minimised through the implementation of the KML Environmental Procedure - Approvals Request and Ground Disturbance CORP-EN-PRO-1004 and the associated GD permitting requirements.

Prior to ground disturbance, and as required by the KML Environmental Procedure - Approvals Request and Ground Disturbance CORP-EN-PRO-1004, a desktop review will be conducted to ensure all proposed disturbance areas are assessed for prospective WStS habitat. Any gaps in the assessment information will be addressed prior to ground disturbance commencing.

4.1.1 Ground Disturbance Inspections and Permits

Once the GD permit is issued but prior to ground disturbance commencing a field inspection will be conducted to ensure the conditions of the GD are being followed. Information collected during this inspection will be recorded on the KML Environmental Form – Pre-Ground Disturbance Inspection CORP-EN-FRM-1027.

The Environmental Form - Ground Disturbance Release CORP-EN-FRM-1014 must be completed, understood and signed off by personnel listed on the form prior to disturbance commencing under the GD Permit.

The Environmental Form - Post Ground Disturbance Inspection CORP-EN-FRM-1015 is also completed by the KML Environmental Department following disturbance to determine if disturbance has been carried out in accordance with the GD permitting requirements and to ensure there has been no unauthorised disturbance to WStS habitat/colonies. Any non-compliance will be reported as an environmental incident and managed through the Safety Procedure - Incident Reporting and Analysis CORP-HS-PRO-1018.

4.2 Maintenance of Habitat

Where infrastructure, roads or rail lines are constructed, large trees and logs will be retained within the disturbance area to resemble WStS habitat and encourage the return of the species to the area. A trained KML Environmental Department representative and the

person supervising the clearing will oversee the salvage and re-creation of habitat. Logs should be placed in piles touching and overlapping each other and vary in size with hollows and/or crevices.

Re-created habitat shall be located in areas with understorey vegetation, at least 5 metres from the edge of the disturbed areas. The habitat will be spaced at intervals of no less than 50 metres and no greater than 100 metres. Existing WStS habitat (trees, logs) will not be compromised in the re-creation of habitat. Habitat creation should only use logs taken from cleared areas.

4.3 Avoidance Constraints

The Project has been designed to minimise disturbance as much as practicable, and to minimise impacts to the surrounding environment. Notwithstanding this, engineering and construction constraints are acknowledged that will result in the impact to WStS colonies or habitats. In these instances KML will undertake translocation of species as outlined in Section 4.4 of this procedure.

4.4 Translocations

KML maintains an Authorisation to take or disturb threatened fauna under Section 40 of the BC Act (BC Act Authority) to carry out the handling of WStS during any translocation process.

The KML Environmental Department have undertaken surveys outside of proposed disturbance areas to identify prospective WStS habitat to be used as receptor sites for any colonies that need to be translocated. Prospective habitat is identified using aerial photography, followed by a thorough search of the area for any evidence (scats, prints) or presence of WStS. Habitat that has been identified as suitable for the translocation of WStS is recorded and maintained on the Geographic Information System (GIS) database.

The translocation methodology detailed in this procedure has been established in consultation with fauna specialists with extensive experience in reptile behaviour and ecology, to ensure best possible chance of success for translocated WStS colonies.

When translocating, all relevant information shall be recorded in the Environmental Form – WStS Translocation CORP-EN-FRM-1035 and maintained in the WStS register in worksite (Folder 7.5).

WStS will only be handled by a fauna specialist or trained KML Environmental Department personnel under an approved BC Act Authority.

All translocations shall be undertaken in accordance with the BC Act Authority and the KML Environmental Safe Work Procedure (SWP) Fauna Handling, Relocation and Euthanasia EN-SWP-042, that included the following management measures:

- All WStS will be translocated and released with their original colony, a minimum of 100m distance from where WStS colonies are known to already exist;
- WStS from different colonies must be translocated separately;
- Where possible, translocations will occur *in situ* (within the log), or manually by hand;
- Translocation sites will be more than 500 metres from the boundaries of Project disturbance areas (Appendix A);
- Translocation must occur as soon as practicable. Individuals shall be separated into clean cloth bags and not left in dangerous locations such as vehicle seats, dashboards or in direct sunlight; and
- Every effort must be made to minimise the stress caused to the animals during the translocation process.

4.4.1 *In Situ* Translocations

Logs in which WStS have been identified will be clearly flagged for translocation by the KML Environmental Department. *In situ* translocations will occur at the discretion of the clearing supervisor in consultation with the KML Environmental Department. The decision to move WStS habitats *in situ* will be dependent on 1) ease of access to the log, 2) equipment availability and capability and 3) the condition of the log.

The clearing supervisor and KML Environmental Department shall determine the most suitable equipment to use for this process (i.e. tray-back ute, flatbed truck, HIAB and sling) and a risk assessment shall be undertaken by personnel involved in the works. During all manual handling activities and mechanical lifting of logs, all appropriate safety requirements must be complied with, however if at any time the process becomes unsafe, the works will be abandoned. Personnel involved in the works will retain a suitable ticket and/or qualification where applicable.

During translocation all exits from the log must be blocked (as far as practicable) using clean rags, or non-intrusive materials, prior to loading onto the vehicle. Logs shall be manoeuvred to minimise damage. Once the log is safely and securely on the back of the vehicle, trained

KML Environmental Department personnel will supervise the transfer of the log to the new suitable habitat.

4.4.2 Manual Translocations

If translocation of entire logs is not safe or practicable, WStS will be removed and relocated separately, either into other translocated logs, or into an entirely new, suitable habitat. This will be undertaken by a fauna specialist or trained KML Environmental Department representative.

WStS will be removed manually by hand from logs or by trapping using Elliot and cage traps. Manual removal may involve damaging logs and should be minimised as much as possible. Trapping will ideally occur during spring and early summer, when WStS are active. When handling WStS, heavy duty gloves should not be worn so that pressure being exerted on the animal is minimised.

Manually removed WStS will be temporarily housed in individual bags, within secured crates to allow air flow and then transported for release back into logs once the habitat has been relocated. If the habitat is unable to be relocated, the WStS will be released into a new suitable habitat that has been previously identified.

4.5 Annual Monitoring

KML shall monitor known control, impact, translocation and surveyed WStS sites within and beyond the project area annually during spring or early summer (when WStS are known to be more active). WStS monitoring control sites have been established to allow a comparison with impacts sites (<500m from operational disturbance).

WStS monitoring is undertaken in accordance with the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC, now DAWE) *Survey guidelines for Australia's threatened reptiles, 2011*.

Annual monitoring is conducted in accordance with KML Environmental SWP Western Spiny-tailed Skink Monitoring EN-SWP-023. This monitoring shall be undertaken during breeding season between spring and summer by a fauna specialist or trained personnel from the KML Environmental Department. The objectives of the monitoring are to:

- Detect impacts from disturbance associated with mining;
- Detect impacts from changed management such as feral species control; and
- Examine the effectiveness of translocations.

4.5.1 Monitoring methodology

WStS surveys shall be conducted by the KML Environmental Department or an external fauna specialist. WStS skinks and/or scats shall be thoroughly searched for in sheltering sites such as hollow logs/trees and roots, piles of timber and rocky outcrops (SEWPaC, 2011) within prospective skink habitats. As WStS are most likely to be encountered in sheltering sites, it is not likely that the survey timing will affect the results (SEWPaC, 2011).

All field monitoring data is to be recorded in KML's GIS system using the KML Environmental Form – WStS Monitoring Form CORP-EN-FRM-1034. Monitoring shall include details on evidence of WStS, such as:

- the age, contents and size of scats and latrines; and
- photographs of monitoring sites and scats.

This information will assist in the determination of recent activity or presence of WStS.

As WStS are known to move between logs, each monitoring site shall have a minimum survey radius of 50m.

Evidence of WStS not previously recorded shall be added to the electronic GIS layer and WStS Register (folder 7.5) for future monitoring.

4.5.2 Monitoring Data Review

Monitoring data shall be reviewed annually by the Environment Superintendent to assess:

- Changes to known WStS populations compared to previous years'.
- Changes to the risk profile to the WStS monitoring sites (i.e. change of project footprint, new construction other than the Project, impacts of feral animals).
- Efficacy of the monitoring program.

Based on this review, the Environmental Superintendent shall amend the monitoring program for the following years in the following manner:

- Where WStS colonies (and its surrounds) have not identified evidence for a period of greater than three (3) years, these sites shall be removed from the annual monitoring schedule.
- Removed sites shall be scheduled for review every three (3) years.
- Colonies showing decline shall be assessed for potential justifications for the decline, and remedial measures (i.e. feral animal monitoring and trapping) shall be prioritised.

5 CHECKING

5.1 Incident Reporting

All WStS injuries, mortalities and unauthorised disturbance to habitat will be reported to the KML Environmental Department via the KML Safety Procedure – Incident Management CORP-HS-PRO-1046 and the Environmental Form - Fauna Sighting and Mortality CORP-EN-FRM-1045. Such occurrences will be documented in INX and investigated as per the incident reporting system. Disciplinary action will apply to personnel found to be interfering with the WStS.

Injured WStS will be cared for until they can be taken to a facility for injured wildlife as per the Environmental Procedure – Terrestrial Fauna Management CORP-EN-PRO-1010. Undamaged dead WStS will be sent to the Western Australian Museum as requested.

5.2 Control of Records

Data collected during surveys and annual monitoring is recorded and stored within KML's GIS system and maintained in the KML Western Spiny tailed Skink Monitoring Register in accordance with the Environmental Procedure – Environment and Heritage Data Management CORP-EN-PRO-1045.

Habitat to which the WStS are translocated shall be recorded in the GIS database, stating the WStS colony identification name and the date the colony was translocated.

5.3 Audits and Inspection

Each year a workload schedule is developed which outlines the plan for system audits throughout the year. Audits on the management of the WStS will be undertaken as per the workload schedule. KML is committed to continual improvement and has adopted an adaptive management approach to managing its impact on the WStS. This procedure shall be reviewed periodically, based on the outcomes of future surveys, monitoring, and the findings of any relevant audit and/or incident investigations or otherwise, to ensure its outcomes and intent remains relevant to KML operations and management strategies.

5.4 Government Reporting

Any information on the number of WStS and/or colonies that are translocated, injured or killed and any occurrences of unauthorised disturbance is reported as part of the following:

- Annual Environmental Report required for EPBC 2006/3017, submitted to the DAWE.
- Annual Compliance Assessment Report for Ministerial Statement 805 and Ministerial Statement 806, submitted to the Department of Water and Environmental Regulation.
- In accordance with any conditions and requirements as per the BC Act Authorisation, submitted to DBCA.

5.5 Document Review

Karara Mining Limited (KML) is committed to continual improvement and has implemented an adaptive approach to managing its potential impact on WStS. This procedure will be reviewed and amended based on the outcomes of monitoring and the findings of any incident investigations; or otherwise every 2 years.

6 DOCUMENT LIST

The documents referred to in this procedure are listed in the table below.

Table 3: Document List

Document Title	Document Number
Environmental Form – Ground Disturbance Release	CORP-EN-FRM-1014
Environmental Form – Post Ground Disturbance Inspection	CORP-EN-FRM-1015
Environmental Form – Pre Ground Disturbance Inspection	CORP-EN-FRM-1027
Environmental Form – Western Spiny-tailed WSTS Monitoring Form	CORP-EN-FRM-1034
Environmental Form – Western Spiny-tailed Skink Translocation Form	CORP-EN-FRM-1035
Environmental Form – Fauna Sighting and Mortality	CORP-EN-FRM-1045
Environmental Form - Information to Support Environmental Assessment of Exploration POWs	CORP-EN-FRM-1059
Environmental Plan – Exploration Environmental Management Plan	CORP-EN-PLN-1002
Environmental Plan – Fauna Management	CORP-EN-PLN-1008
Environmental Plan – Feral Animal Management	CORP-EN-PLN-1009
Environmental Plan – Environmental Management Plan	CORP-EN-PLN-1020
Environmental Procedure – Approvals Request and Ground Disturbance	CORP-EN-PRO-1004
Environmental Procedure – Terrestrial Fauna Management	CORP-EN-PRO-1010
Environmental Procedure – Information to Support Environmental Assessment of Exploration POWs	CORP-EN-PRO-1041
Environmental Procedure – Environment and Heritage Data Management	CORP-EN-PRO-1045
Environmental Safe Work Procedure - Western Spiny-tailed Skink Monitoring	EN-SWP-023
Environmental Safe Work Procedure - Fauna Handling, Relocation and Euthanasia	EN-SWP-042
Safety Procedure – Training and Induction	CORP-HS-PRO-1001
Safety Procedure – Incident Reporting & Analysis	CORP-HS-PRO-1018
Safety Procedure – Incident Management	CORP-HS-PRO-1046

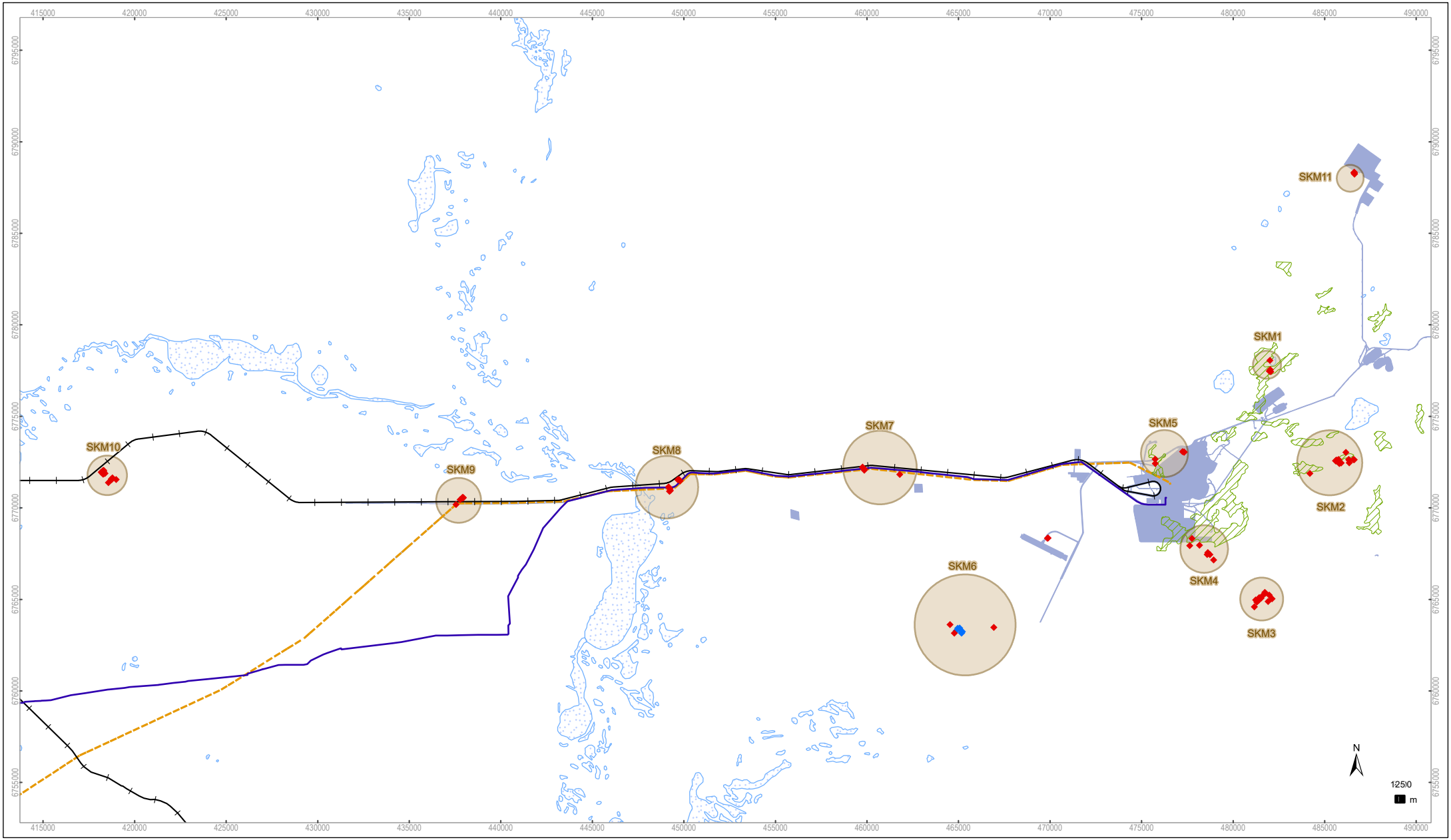
7 REFERENCES

Cogger et al (1993). *The Action Plan for Australian Reptiles* (online). Available from: http://www.environment.gov.au/biodiversity/threatened/publications/action/reptiles/index.html

Department of Environment and Conservation (2012). Western Spiny-tailed Skink *Egernia stokesii* Recovery Plan. Department of Environment and Conservation, Perth, WA.

Department of Sustainability, Environment, Water, Population and Communities (2011). Survey guidelines for Australia's threatened reptiles. Commonwealth of Australia 2011.

APPENDIX A: WESTERN SPINY-TAILED SKINK MONITORING MAP

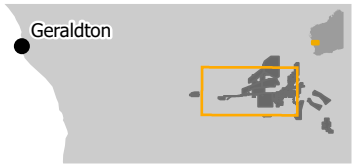


Western Spiny-tailed Skink Monitoring

Greater Karara Region

KARARA MINING LTD

- WSTS Evidence Location
- Potential Translocation Sites
- WSTS Prospective Habitat
- Raw Water Pipeline
- Rail Centreline
- Power Transmission Route
- WSTS Monitoring Area
- Project Area
- Waterbody



Ref: K0107 F14
Version: A
31 March 2022

Proj: GDA94 MGAZ50
Scale: 1:275,000
Size: A4

APPENDIX B: TABLE OF CHANGES VERSION 4 TO VERSION 5

Document Review Comments Sheet

Reviewer: Andre Marais	
Document Title: CORP-EN-PRO-1024 Western Spiny Tailed Skink Management, Monitoring and Translocation	
Document Revision: Revision 4 to 5	
Date of Review: 12 April 2022	

Version 4		**Version 5**		**Section**	**Reviewer Comment / Recommendations**
Page No.	**Section No.**	**Page No.**	**Section No.**		
1	1	1	1	Purpose & Scope	Reworded the Project activities and infrastructures with the same content. Added the objectives of the Western Spiny-tailed Skink (*Ergernia skokesii*) National Recovery Plan (DEC 2021). Removed reference of Condition 2 of EPBC 2006/3017 in the objectives, as it is relevant to the EPBC listed Vulnerable Malleefowl (*Leipoa ocellata*). Specified Condition 10 and 11 of MS805 and Condition 9 and 10 of MS806. Specified when the procedure will be reviewed and amended.

Version 4		Version 5		Section	Reviewer Comment / Recommendations
Page No.	**Section No.**	**Page No.**	**Section No.**		
					Amended review of the procedure by DBCA and DAWE should any substantial changes to the procedure resulting in any new or increased impacts on WStS.
1	1.1	1-2	1.1	Objectives	Reworded the objectives with the same content.
2	2	3	2	Definitions	Added the new terms in this revision and updated the definition of 'the Project' with the same content.
3 - 6	3 (3.1 – 3.3)	4-7	3 (3.1 – 3.3)	Planning; • Legal Requirements • Tenement Requirements • Roles and Responsibilities • Competence, Training and Awareness	Updated the State legislations and deleted legislations not relevant to this procedure. Updated the WStS status listed under the BC Act and specified Condition 1 of EPBC Act 2006/3017. Updated the Authorisation to take or disturb threatened fauna under BC Act. Changed Section 3.1.1 title to 'Exploration Activities'. Changed Section 3.3 title to 'Competence, Training and Awareness'. Changed induction not limited to the information listed in Version 4. Added descriptions of the KML's online training management system (InTuition).

Version 4		Version 5		Section	Reviewer Comment / Recommendations
Page No.	**Section No.**	**Page No.**	**Section No.**		
8	4.3	9	4.3	Avoidance Constraints	Re-arranged this section and specified engineering and construction constraints that may result in the impact to WStS. Removed portion to streamlined section – Avoidance Constraints;
8-10	4.4	9-11	4.4	Translocations	Changed 'will obtain' to 'maintains' an Authorisation to take or disturb threatened fauna as KML always maintains an annual Authorisation to take or disturb threatened fauna. Updated the Licence to Take Fauna with Authorisation to take or disturb threatened fauna under BC Act. Changed 'translocation by an appropriately trained KML Environment Department personnel' to 'the KML Environment Department' Added 'personnel involved in the works will retain a suitable ticket and/or qualification where needed' in 'In Situ Translocations' section. Deleted last sentence in section 4.4.2 associated with on-going annual monitoring, which is discussed in section 4.5.
10-11	4.5 and 4.5.1	11-12	4.5, 4.5.1 and 4.5.2	Annual Monitoring	Added 'now DAWE' after SEWPaC.

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					Re-arranged field monitoring data records and survey radius with the same content. Added 'new evidence of WStS to be added to the electronic GIS layer' Moved the review of monitoring data to the new section 4.5.2. Inserted new section 4.5.2 Monitoring Data Review to detail the aspects for annual monitoring data review and proposed amendment of the monitoring program based on the annual monitoring data review. The follows have been added: Monitoring data shall be reviewed annually by the Environment Superintendent to assess: • Changes to known WStS populations compared to previous years'. • Changes to the risk profile to the WStS monitoring sites (i.e. change of project footprint, new construction other than the Project, feral animals). • Efficacy of the monitoring program.

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					Based on this review, the Environmental Superintendent shall amend the following years monitoring in the following manner: • Where WStS colonies (and its surrounds) have not identified evidence for a period of greater than three (3) years, these sites shall be removed from the annual monitoring schedule. • Removed sites shall be scheduled for review every three (3) years. • Colonies showing decline shall be assessed for potential justifications for the decline, and remedial measures (i.e. feral animal monitoring and trapping) shall be prioritised.
12	5.2	13	5.2	Control of Records	Re-arranged with the same content. Deleted "All field monitoring forms shall be scanned and saved on the KML filesite folder 7.5 for the monitoring period. All photographs from the monitoring period shall be saved in filesite folder 4.5.32"
13	5.4	13-14	5.4 and 5.5	• Government Reporting • Document Review	Re-arranged and updated with current government reporting requirements. Inserted new section 5.5 Document Review to detail the review of this procedure and regulators' approval

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					for any substantial changes to this procedure. The follows have been added: "Karara Mining Limited (KML) is committed to continual improvement and has implemented an adaptive approach to managing its potential impact on WStS. This procedure will be reviewed and amended based on the outcomes of monitoring and the findings of any incident investigations; or otherwise every 2 years."
14	6	15	6	Document List	Deleted the documents that have not been referred to in this procedure.
15	7	16	7	References	Added "Department of Environment and Conservation (2012). Western Spiny-tailed Skink *Egernia stokesii* Recovery Plan. Department of Environment and Conservation, Perth, WA"
16	Appendix A	19	Appendix A	Appendix A	Updated the WStS Monitoring Map based on review of recent years' monitoring data in line with section 4.5.2 Monitoring Data Review. Fifty-seven (57) sites have been removed from the map as those sites have been identified uninhabited for recent three consecutive year (2019 – 2021).

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