Hail Creek Coking Coal (HCOC) Eastern Margin Extension – EPBC Referral

Attachment F1

ECOLOGICAL IMPACT ASSESSMENT - APPENDICES A-F (SLR, 2025c)

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

Prepared by:

SLR Consulting Australia

SLR Project No.: 626.30128.00000

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Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Hail Creek Coal Holdings Pty Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Executive Summary

Hail Creek Coal Holdings Pty Limited (HCC) have proposed an amendment to Environmental Authority (EA) EPML00661913 for developing portions of the Hail Creek Eastern Margin Extension Project (the Project). The Project footprint is approximately 679.2 hectares (ha) and will impact upon Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES) (599.8 ha is remnant vegetation and 79.4 ha is non-remnant vegetation).

An initial ecological assessment was undertaken to identify MSES and MNES that are likely and/or known to occur within the Project area. Following this, an impact assessment was conducted to determine if significant impacts will occur to the identified MSES and MNES. Significant residual impacts were determined to occur to multiple prescribed environmental matters (PEMs). Those matters, the type of matter and quantity for which a significant impact will occur for each matter are provided in **Table E-1** below.

For those PEMs that will be assessed through the State approvals process for offsets, a land-based approach should take precedence and be co-located in an offset area for those MNES identified in **Table E-1** below. Residual matters or quantities not fully covered in the offset area/s can then be sought through a financial settlement. A financial settlement for MSES involves using the Queensland Government web-based financial settlement offset calculator.

Significant impacts to MNES (Koala (*Phascolarctos cinereus*) and Squatter Pigeon (Southern) (*Geophaps scripta scripta*) habitat) have been identified to occur and a referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) will be required for the Project. A land-based offset mechanism is required under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Environmental Offset Policy for significant impacts to MNES. Multipliers for land area are determined via a number of parameters, many of which are dependent on attributes of a suitable offset land parcel. Confirmation of the amount of land required to be used as an offset will be determined from the DCCEEW's *Offset Assessment Guide* (DCCEEW, 2023a).

Table E-1 Summary of environmental matters and quantification of significant residual impacts

Environmental Matter	Type of matter for which significant residual impact is assessed	Significant impact	Quantity of Significant Impact (ha)
Regulated Vegetation (of concern *Vegetation Management Act 1999* (VM Act) status)	MSES	Yes	15.0 ha of RE 11.3.4 82.1 ha of RE 11.4.2 4.0 ha of RE 11.9.4 171 ha of RE 11.9.7 **Total of 272.1 ha**
Regulated Ecosystem within the defined distance of a watercourse	MSES	Yes	0.5 ha of RE 11.3.25a 4.0 ha of RE 11.3.4 0.8 ha of RE 11.4.2 8.1 ha of RE 11.9.2 10.9 ha of RE11.9.7 23.9 ha of RE 11.9.9 **Total of 48.2 ha**

Environmental Matter	Type of matter for which significant residual impact is assessed	Significant impact	Quantity of Significant Impact (ha)
Connectivity	MSES	Yes	**599.8 ha**
Squatter Pigeon (Southern) (*Geophaps scripta scripta*)	MSES and MNES (Overlapping prescribed matter)	Yes	**595.8 ha**
Koala (Phascolarctos cinereus)	MSES and MNES (Overlapping prescribed matter)	Yes	**595.8 ha**
White-throated Needletail (*Hirundapus caudacutus*)	MSES and MNES (Overlapping prescribed matter)	No	
Glossy Black-Cockatoo (*Calyptorhynchus lathami erebus*)	MSES	No	
Southern and Central Greater Glider (*Petauroides volans (syn. Petauroides volans volans))*	MSES and MNES (Overlapping prescribed matter)	No	
Ornamental Snake (*Denisonia maculata*)	MSES and MNES (Overlapping prescribed matter)	No	
Short-beaked Echidna (*Tachyglossus aculeatus*)	MSES	No	
Black Ironbox[1] (*Eucalyptus raveretiana*)	MNES	No	
Semi-evergreen Vine Thickets (SEVTs) of the Brigalow Belt Threatened Ecological Community (TEC)	MNES	No	
Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	MNES	No	

1. At the time of submission this species was only listed under the EPBC Act but during the approvals process it was uplisted under the NC Act.

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Acronyms and Abbreviations

BWH	Brumby Waterhole
CWD	Coarse Woody Debris
cm	Centimetres
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHP	Department of Environment and Heritage Protection (now known as DETSI)
DES	Department of Environment and Science (now known as DETSI)
DESI	Department of Environment, Science and Innovation (now known as DETSI)
DETSI	Department of the Environment, Tourism, Science and Innovation
DEWHA	Department of the Environment, Water, Heritage and the Arts
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DoR	Department of Resources
EA	Environmental Authority
EO Reg	*Environmental Offsets Regulation 2014*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EVNT	Endangered, Vulnerable and Near Threatened
ha	Hectares
HCC	Hail Creek Coal Holdings Pty Limited
HCOC	Hail Creek Open Cut
HNP	Homevale National Park
km	Kilometre
KoRV	Koala Retrovirus
m	Metre
ML	Mining Lease
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significant
Mtpa	Million tonnes per annum
NC Act	*Nature Conservation Act 1992*
PEMs	Prescribed Environmental Matters
RE	Regional Ecosystem
RoM	Run of Mine
SBC	Statewide Biodiversity Corridor
SEVT	Semi-evergreen Vine Thickets
SLR	SLR Consulting Australia Pty Ltd

SPRAT	Species Profiles and Threats Database
TEC	Threatened Ecological Community
VM Act	*Vegetation Management Act 1999*

1.0 Introduction

The Hail Creek Open Cut Mine (HCOC) is owned by Hail Creek Coal Pty Limited (HCC), Sumisho Coal Development Queensland Pty Ltd and Marubeni Coal Pty Ltd (Hail Creek Joint Venture) and is operated by HCC (a subsidiary of Glencore Coal Assets Australia). HCOC is an open cut operation where coal is mined using conventional open-cut strip-mining methods, with approval to produce up to 20 million tonnes of Run of Mine (RoM) coal per annum (Mtpa RoM). HCOC is operated under an Environmental Authority (EA) EPML00661913 on Mining Leases (MLs) 4738 and 700026. HCOC is located in the Isaac Regional Council Local Government Area, approximately 85 kilometres (km) southwest of Mackay and 35 km northwest of Nebo.

HCC have proposed an amendment to the EA for the Hail Creek Eastern Margin Extension (the Project). The EA amendment areas occur outside of the existing approved disturbance and collectively form the study area (**Figure 1**) for this Impact Assessment Report. This study area has been reduced in this assessment from the original conceptual designs provided in the baseline assessment in **Appendix A**. The study area comprises the following four distinct assessment areas incorporating a total of 679.2 hectares (ha) **Figure 1**:

- Area 1 (approximately 6.3 ha) – two small polygons (approximately 4.5 ha and approximately 1.8 ha) in the northern portion of ML4738 that form part of the proposed Kemmis pit extension;
- Area 2 (approximately 136.6 ha) – incorporates the proposed Homevale pit in the northern portion of ML4738;
- Area 3 (approximately 140.3 ha) – proposed Exevale pit extension immediately south of Area 2 within ML4738; and
- Area 4 (approximately 396.0 ha) – proposed Carrinyah pit extension in the southeast corner of ML4738.

SLR Consulting Australia Pty Ltd (SLR) were engaged to undertake a desktop and field-based assessment of ecology matters within the study area to determine the presence of Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES) and implications for the Project environmental approvals and environmental offset liability.

HAIL CREEK

MAJOR EA AMENDMENT

FIGURE 1
Study Area

LEGEND

- Watercourse
- Mining Lease
- EA Authorised Extent of Disturbance
- EA Amendment Proposed Extent of Disturbance

Area 1
Area 2
Area 3
Area 4
Homevale Pit
Kemmis Pit
Exevale Pit Extension
Exevale Pit
Exevale Dump
Dump 6 - 11
West dam
Dump 3
Main Western Pit
Carrinyah Pit
Levee dump
Carrinyah Dump
MIA
Tailings dam
CDA2 tailings dam
Dump 4
Ramp 0
Ramp 0 dump
Ramp 0/TSF2
Carrinyah Pit Extension
ML 700026
ML 4738
Schammer Creek
Brumby Creek
Absent Creek
Hail Creek
Middle Creek
Noah Creek
Bee Creek
Cooper Creek
Moonlight Creek
Oaky Creek

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	28-Apr-2025
Drawn by:	LC

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\SLR626301 28 Hail Creek Major EA Amendment - Proposed Disturbance Areas and Site Layout.mxd

1.1 Purpose of Report

The purpose of this report is to accompany the *Application to amend an environmental authority* submitted by HCC on behalf of the Hail Creek Joint Venture. This report contains relevant supporting information on MSES and MNES that occur within the study area, assessment of significant impacts and indicative environmental offset liability for impacts to these matters. Offset liability has been determined for MSES on the assumption that the preferred offset mechanism is via a land-based approach, with any residual amounts delivered as a financial offset. For MNES, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Offsets Policy stipulates that the majority of environmental offset delivery must be through a land-based mechanism. This report identifies the total area of MNES where a significant impact has been identified as likely to occur and the associated habitat condition and quality in order to inform land-based offset area calculations, if required for Commonwealth environmental approvals.

1.2 Legislative Background

1.2.1 Matters of National Environmental Significance

The EPBC Act provides a legal framework for the protection of nationally significant (protected) animals, plants, habitat and places. The EPBC Act covers nine protected matters, also known as MNES:

- Listed threatened species and communities;
- Listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine environment;
- World heritage properties;
- National heritage places;
- The Great Barrier Reef Marine Park;
- Nuclear actions; and
- A water resource, in relation to unconventional gas development and large coal mining development.

A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Where an action is likely to have a significant impact on a MNES the action must be referred to the Minister for a decision on whether assessment and approval is required under the EPBC Act. To determine whether an action is likely to have a significant impact, guidelines have been developed for self-assessment. The significant impact guidelines provide overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBC Act. This report identifies conservation significant species (listed threatened and migratory species) and communities associated with the Project. Terrestrial and aquatic groundwater-dependent ecosystems were assessed in a separate study (SLR, 2024) and are not included in this report.

1.2.2 Matters of State Environmental Significance

The Queensland Environmental Offset Regulation 2014 defines prescribed environmental matters, also known as MSES, which include:

- Regulated vegetation;
- Connectivity areas;
- Wetlands and watercourses;
- Protected wildlife habitat;
- Koala habitat in South-East Queensland;
- Protected areas;
- Fish habitat areas and highly protected zones of state marine parks;
- Waterway providing for fish passage;
- Marine plants; and
- Legally secured offset areas.

A significant residual impact is defined under the Queensland Environmental Offsets Policy (DETSI, 2025) as an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:

- Remains, or will or is likely to remain (whether temporary or permanently) despite on-site avoidance and mitigation measures for the prescribed activity; and
- Is, or will or is likely to be, significant.

After measures to avoid and mitigate impacts are taken and there is still an impact on prescribed environmental matters, an offset may be required. To determine whether an impact is likely to have a significant residual impact, guidelines have been developed. For any new development, all impacts to MSES must be avoided or minimised where possible. Where there is a significant residual impact to MSES (as determined through the application of the guideline), an environmental offset may be required in accordance with the Queensland Environmental Offsets Policy.

2.0 Methodology

2.1 Previous Studies

Detailed assessment of the study area including the methodology and results of a literature review, database searches, aquatic ecology and field assessments are presented in the Ecological Assessment Report (SLR, 2025; **Appendix A**). The Ecological Assessment Report also provides a review and an assessment of the relevance of using conservation significant species habitat mapping by EcoSM (2015) (**Appendix G**) for the Hail Creek Transition Project and contemporises that data with current legislation, database searches and field assessments. Utilising this previous data was determined to be appropriate due to the overlap in study areas and the extent of effort utilised in this previous project. In total, EcoSM conducted 60 field days between February 2012 and February 2015 to collect sufficient data for the Hail Creek Transition Project. This involved seasonal surveys to ground-truth vegetation communities, identify conservation significant flora and fauna species and their habitat within the study area, determine the MSES and MNES that occurred within the study area and provide recommendations to avoid these environmental matters. The Ecological Assessment Report relied on this data as well contemporary field assessments. A few minor changes to the ground-truthed EcoSM (2015) mapping was identified by SLR during field assessments as follows:

- A small polygon (approximately 0.9 ha) mapped as RE 11.9.2 in the northwest corner of Area 4 contained a floristic composition, diversity and structure and soil characteristics as RE 11.3.4;
- A small polygon (approximately 1.7 ha) in the central portion of Area 4 was mapped as RE 11.9.2 but contained a floristic composition, structure and diversity as RE 11.9.4; and
- A small polygon (approximately 0.7 ha) in the southwestern corner of Area 4 was mapped as RE 11.3.2 but surface geology mapping (QLDGlobe, 2025) depicts this area as lithic sandstone and pebbly lithic sandstone (landzone 9) which was confirmed during field assessments. This small polygon was remapped as a continuation of a large polygon of RE 11.9.7 that borders this area to the west.

Recommendations to amend the initial design to avoid impacts to MSES and MNES in the Ecological Assessment Report (SLR, 2025) were applied and an updated design was developed. Impacts to MSES and MNES of that new design is provided in this report (**Appendix B**). Methodologies to determine the quality of MSES and MNES identified in the Ecological Assessment Report (SLR, 2025) are provided in **Section 2.2**. Results regarding aquatic ecology, as provided in the Ecological Assessment Report (SLR, 2025), indicate that no significant impacts to aquatic features will occur from the Project and due to this no significant impact assessment for those features is included in this report.

2.2 Habitat Quality Assessments

The *Guide to Determining Terrestrial Habitat Quality*, version 1.3 (DES, 2020) was used to assess the quality of vegetation communities with the study area. These assessments provide a measure of terrestrial ecosystem function with respect to biodiversity values (Eyre *et al.*, 2015) and are used in the calculations for any land-based offsets. It is a site-based, quantitative and therefore repeatable assessment procedure that can be used in any vegetation community. It focuses on the collection of key surrogate conditions of biodiversity, which can be obtained quickly and easily, providing a rapid assessment of overall biodiversity-supportive values. The assessment provides a site-based score based on weighted vegetation, microhabitat and landscape conditions, with each site compared to

predetermined benchmark conditions for that particular Regional Ecosystem (RE). The score is further categorised into a BioCondition score out of ten, which can be used to facilitate comparisons between sites and incorporated into other quantification processes. Maps containing the location of each assessment location are provided in **Appendix B**. Raw data for each BioCondition assessment can be found in **Appendix C**. SLR was commissioned to collect condition data that may be incorporated into the offset strategy and planning. Condition data is presented in **Appendix D** to inform the offset strategy where required.

BioCondition assessments were conducted by SLR in November 2022 and March 2023. A total of 29 BioCondition assessments (**Appendix C**) were conducted in seven RE's as per **Table** . Conditions were optimal during both surveys with the majority of groundcover species flowering or seeding which aided in identification. Photographs were taken at each end of a 100 metre (m) transect and at the centre of the transect, facing north, south, east and west. Representative photographs for each site can be found in **Appendix E**. All RE's were determined to be remnant, and no regrowth vegetation has been ground-truthed.

RE 11.9.4 is listed as a vegetation community that may meet the condition threshold for the Semi-evergreen vine thickets (SEVTs) of the Brigalow Belt (north and south) and Nandewar bioregions Threatened Ecological Community (TEC). The key diagnostic characteristics and condition criteria were assessed during BioCondition assessments in this community.

Table 1 RE's and Number of BioCondition Assessments that were conducted in the Study Area

Regional Ecosystem	VM Act Class	Biodiversity Status	Amount in Study Area (ha)	Suggested Number of BC Required [1]	Number of BC Completed	Short Description
RE 11.3.4	Of concern	Of concern	15.0	2	5	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. Woodland on alluvial plains
RE 11.3.25a	Least concern	Of concern	0.5	2	3	*Eucalyptus raveretiana, Eucalyptus tereticornis* and *Melaleuca fluviatilis* woodland
RE 11.4.2	Of concern	Of concern	82.1	3	2	*Eucalyptus* spp. and/or *Corymbia* spp. grassy or shrubby woodland on Cainozoic clay plains
RE 11.9.2	Least concern	No concern at present	130.7	4	5	*Eucalyptus melanophloia* +/- *E. orgadophila* woodland to open woodland on fine-grained sedimentary rocks
RE 11.9.4	Of concern	Endangered	4.0	2	3	Semi-evergreen vine thicket or *Acacia harpophylla* with a semi-evergreen vine thicket understorey on fine-grained sedimentary rocks
RE 11.9.7	Of concern	Of concern	171	4	6	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks

Regional Ecosystem	VM Act Class	Biodiversity Status	Amount in Study Area (ha)	Suggested Number of BC Required [1]	Number of BC Completed	Short Description
RE 11.9.9	Least concern	No concern at present	196.5	4	5	*Eucalyptus crebra* woodland on fine-grained sedimentary rocks
Non-remnant	-	-	79.4	-	-	-

1. Suggested number of sampling sites in the *Guide to determining terrestrial habitat quality* (DES, 2020).

In accordance with the Assessment Manual BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Eyre *et al.*, 2015) all ecological condition indicators were measured within a 100 x 50 m plot and relevant subplots. Along the 100 m transect line the following data were recorded:

- Tree canopy cover. This is the proportion of the 100 m transect intersected by the foliage of a tree within the emergent, canopy and sub-canopy layer. In order to calculate cover, an observer walked along the transect line, looking up and noting at which point on the transect an overlap with the tree canopy occurred. The observer then walked along the transect until it no longer overlapped with the canopy and noted this point on the transect line. The difference in length between the two points is the length of canopy cover. This was repeated for the length of the transect, and the canopy cover lengths were added to give a percentage tree canopy cover; and
- Shrub canopy cover. This is the proportion of the 100 m transect intersected by the foliage of shrubs. Calculation of cover was as per 'tree canopy cover' above. A 100 m x 50 m plot was marked out from 25 m out from each of the 0 m and 100 m points. Within this area, the following data were recorded:
    - Tree height. The median height of the emergent, canopy, and sub-canopy heights were recorded;
    - Number and Diameter at Breast Height (DBH) of large eucalypt and non-eucalypt trees. A large tree is a tree with a DBH greater than the size threshold specified in the relevant benchmark document for the RE, or if no benchmark document exists, a eucalypt of DBH >30 centimetres (cm) or a non-Eucalypt of DBH >20 cm is used. All trees meeting these requirements were counted within the plot then extrapolate to trees per ha;
    - Native tree and shrub species richness. The number of native tree and shrub species present, determined by walking through the plot and identifying each species; and
    - Recruitment of woody perennial species. This is the proportion of tree species represented by at least one recruit (an individual <5 cm DBH).

A 50 m x 20 m plot was marked out at 10 m either side of the transect at the 25 m and 75 m points. Within this area the following data were recorded.

- Coarse Woody Debris (CWD) is the cumulative length of all logs within the plot that are:
    - >10 cm in diameter;
    - >50 cm total length; and
    - >80 % in contact with the ground.

If a log was partly within the plot, only the part of the log within the plot was measured. If a log was in part greater than 10 cm in diameter, only the section of appropriate diameter was measured.

A 50 m x 10 m plot was marked out at 5 m either side of the transect at the 25 m and 75 m points. Within this area the following data were recorded:

- Native grass and forb species richness. The number of non-woody species (grass and forbs) present within the ground layer, determined by walking through the plot and identifying each species; and

- Non-native plant cover. An estimate of the total cover of all non-native species within the plot, determined by averaging the non-native plant cover within smaller sub-plots within this area.

Finally, five 1 m x 1 m quadrats were placed along the transect from the 25 m point to the 65 m point and assessed for:

- Total native perennial grass cover (the percentage of native perennial grasses); and
- Organic litter.

Cover percentages for each of the above were averaged across the five quadrats to give a final value for each feature contributing to ground cover.

2.3 Species Habitat Attributes

Species habitat attribute assessments for conservation significant species in accordance with the *Guide to Determining Terrestrial Habitat Quality*, version 1.3 (DES, 2020) incorporate a combination of indicators to measure the overall viability of a site and its capacity to support a prescribed environmental matter (DES, 2020). Information from a desktop and field assessment provides a species habitat score that can be used as part of the calculations for any land-based offset. SLR was commissioned to collect condition data that may be incorporated into the offset strategy and planning. Condition data is presented in this report to inform the offset strategy where required.

The *Guide to Determining Terrestrial Habitat Quality,* version 1.3 (DES, 2020) was used to score terrestrial conservation significant species habitat. During the field assessments, a total of 115 habitat condition assessments were conducted. This included 36 assessments for Koala (Phascolarctos cinereus) (in RE's 11.3.4, 11.3.25a, 11.4.2, 11.9.2, 11.9.7 and 11.9.9), 36 assessments for Squatter Pigeon (Southern) (*Geophaps scripta scripta*) (in RE's 11.3.4, 11.3.25a, 11.4.2, 11.9.2, 11.9.7 and 11.9.9), 12 assessments for Southern and Central Greater Glider (*Petauroides volans (syn. Petauroides volans volans))* (in RE's 11.3.4 and 11.3.25a), 25 assessments for Ornamental Snake (*Denisonia maculata*) (in RE's 11.3.4, 11.3.25a, 11.4.2 and 11.9.7) and six assessments for Glossy Black-Cockatoo (*Calyptorhynchus lathami erebus*) (in RE 11.3.25a). Assessments were not conducted for White-throated Needletail as this species is entirely aerial in Australia or Short Beaked Echidna as all remnant areas are considered habitat for this species and significant impacts are unlikely.

RE's assessed for each conservation significant species was determined from those that occur within the ML, previous significant impact assessments for these species (EcoSM, 2015), listed RE's in each species essential habitat factors listed in the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development's vegetation management report and relevant conservation advice for each species. Site names, species that were assessed and raw scores for each assessment site can be found in **Appendix D** (**Tables D2-D3**). At each habitat condition assessment site, species habitat attributes for the appropriate conservation significant species were completed.

For each species, specific indicators were determined for the following habitat attributes:

- Quality and availability of food and habitat required for foraging;
- Quality and availability of habitat required for shelter and breeding;
- Quality and availability of habitat required for mobility; and
- Absence of threats.

Each indicator was scored from zero to five in the field. Each score was then multiplied by five to convert it to a score between zero and 25. Indicator scores were averaged for each attribute (except for absence of threats) to obtain an overall score out of 25 for each attribute. Scoring for absence of threats requires rating the scope and severity of each threat from the threat matrix (out of 25) provided in the *Guide to Determining Terrestrial Habitat Quality*, version 1.3 (DES, 2020). Low scores correspond to a high risk to the species, whereas a high score represents a very low threat to the species. The lowest score out of all the threat indicators is the absence of threat final score. The sum for each of the four attributes were totalled and divided by 10 to provide a species habitat score. Attributes, indicators and references derived for each species can be found in **Table 2** through to **Table 6**.

In each RE that is mapped as habitat for the conservation significant species above, the BioCondition and habitat condition scores were weighted equally and averaged separately. The averaged BioCondition and habitat condition scores were then combined for each RE. These combined BioCondition and habitat condition scores for each RE were then averaged to provide an overall quality score for the study area. These methods were used for both State and Commonwealth conservation significant species. These final scores are found in **Section 6.0**.

It is noted that the indicators for Koala and Southern and Central Greater Glider habitat are distinct and therefore they do not necessarily overlap. The indictor criteria has been developed based on relevant literature including that provided by DCEEWW.

Table 2 Attributes and indicators used to determine Koala habitat scores

Koala		
Attributes	**Indicators**	**References**
• Quality and availability of food and habitat required for foraging;	• Relative percent abundance of *Eucalyptus* food trees in canopy; • Relative number of feed trees present; and • Leaf moisture, trees situated near semi or permanent water sources.	• DCCEEW (2024) Referral guidance for the endangered koala. • (Youngentob, Marsh and Skewes, 2021): A review of koala habitat assessment criteria and methods. Canberra. Available at: www.anu.edu.au; • DCCEEW (2025): Species Profiles and Threats Database (SPRAT), Department of Climate Change, Energy, the Environment and Water; • Gordon et al. (1988): 'A koala (*Phascolarctos cinereus Goldfuss*) population crash during drought and heatwave conditions in south-western Queensland', Australian Journal of Ecology, 13(4), pp. 451–461. Available at: https://doi.org/10.1111/J.1442-9993.1988.TB00993.X; • Melzer et al. (2014): 'The habitat and diet of koalas (*Phascolarctos cinereus*) in Queensland', Australian Mammalogy, 36(2), pp. 189–199. Available at: https://doi.org/10.1071/AM13032; • (Menkhorst and Knight, 2011): A field guide to the mammals of Australia. 3rd edn. New York: Oxford University Press; and • DAWE (2022a): Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory. Canberra.
• Quality and availability of habitat required for breeding and shelter;	• Open forest woodland, open woodland incl. remnant and regrowth with structural complexity to shelter from heat and predation; • Preferred RE's 11.3.2, 11.3.2a, 11.3.2b, 11.3.4, 11.3.4a, 11.3.25a, 11.3.27. Various others suitable or marginal; and • High canopy cover.	
• Quality and availability of habitat required for mobility; and	• Canopy connectivity; • High canopy cover; • Preferred RE's 11.3.2, 11.3.2a, 11.3.2b, 11.3.4, 11.3.4a, 11.3.25a, 11.3.27. Various others suitable or marginal; • Trees likely selected based on height, canopy cover; and • Percentage of remnant vegetation within 500 m.	
• Absence of threats.	• Vehicle strikes; • Heat wave or drought; • Predation from invasive species; and • Fragmentation of habitat.	

Table 3 Attributes and indicators used to determine Squatter Pigeon (Southern) habitat scores

Squatter Pigeon		
Attributes	**Indicators**	**References**
• Quality and availability of food and habitat required for foraging;	• Mostly seeds of Fabaceae, incl. exotic pasture plants e.g., *Stylosanthes* and native grasses; • Drinks water daily. Nearly always within 3 km of waterbodies. Gently sloping bare ground on bank; and • Overstory generally dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris*.	• (DCCEEW, 2025): Species Profiles and Threats Database (SPRAT), Department of Climate Change, Energy, the Environment and Water; • Garnett, Szabo and Dutson (2011): The Action Plan for Australian Birds 2010. Melbourne: CSIRO Publishing; • TSSC (2015): Conservation Advice *Geophaps scripta scripta* Squatter pigeon (southern). Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl; • Higgins and Davies (1996): Handbook of Australian, New Zealand & Antarctic Birds: Volume 3: Snipe to Pigeons. Melbourne: Oxford University Press; and • Lloyd et al, (2025). Habitat associations of the Southern Squatter Pigeon *Geophaps scripta scripta* in Queensland.
• Quality and availability of habitat required for breeding and shelter;	• Remnant, regrowth, partly modified communities; tracks and roadsides; • Overstorey generally dominated by *Eucalyptus, Corymbia, Acacia* or *Callitris*; and • Needs well-draining soils, nests on ground in various landzones probably within 1 km of water.	
• Quality and availability of habitat required for mobility; and	• Overstorey generally dominated by *Eucalyptus, Corymbia, Acacia* or *Callitris*; • Open forests to sparse open woodlands and scrub. Generally open, short grass cover (rarely exceeds 33 %); • Bare ground under tree canopy; bare gravelly or dusty patches with leaf litter and CWD; roads, stockyards; and • Remnant, regrowth, partly modified communities; tracks and roadsides.	
• Absence of threats.	• Vehicle strike; • Predation from invasive species; • Decrease in available food due to undesirable pasture species; and • Decreased available permanent/semi-permanent water.	

Table 4 Attributes and indicators used to determine Southern and Central Greater Glider habitat scores

Central Greater Glider		
Attributes	**Indicators**	**References**
• Quality and availability of food and habitat required for foraging;	• Percent of feed trees present; • Number of tall mature trees present with large DBH; and • Habitat within or close to riverine or montane vegetation community.	• DCCEEW (2025): Species Profiles and Threats Database (SPRAT), Department of Climate Change, Energy, the Environment and Water; • Emerson, Ballard and Vernes (2019): 'Conventional distance sampling versus strip transects and abundance indices for estimating abundance of greater gliders (*Petauroides volans*) and eastern ringtail possums (*Pseudocheirus peregrinus*)', Wildlife Research, 46(6), pp. 518–532. Available at: https://doi.org/10.1071/WR18155; • DCCEEW (2022): Conservation Advice for *Petauroides volans* (greater glider (southern and central)). Canberra; • Menkhorst and Knight (2011): A field guide to the mammals of Australia. 3rd edn. New York: Oxford University Press; and • McGregor et al. (2020) 'Genetic evidence supports three previously described species of greater glider, *Petauroides volans, P. minor,* and *P. armillatus',* Scientific Reports, 10(1), pp. 1–11. Available at: https://doi.org/10.1038/s41598-020-76364-z.
• Quality and availability of habitat required for breeding and shelter;	• Habitat within or close to riverine or montane vegetation community; • Number of hollow trees present; and • Lushness/wetness of vegetation community.	
• Quality and availability of habitat required for mobility; and	• Remnant vegetation on landzone 3 or 4; • Height of canopy; • Amount of fire damage present; and • High fertility soils present.	
• Absence of threats	• Fire in habitat; • Clearing of habitat; • Decrease in available hollows; and • Fragmentation of habitat.	

Table 5 Attributes and indicators used to determine Ornamental Snake habitat scores

Ornamental Snake		
Attributes	**Indicators**	**References**
• Quality and availability of food and habitat required for foraging;	• Longevity of surface water; • Presence of gilgai; and • Habitat for frogs present.	• DCCEEW (2025): Species Profiles and Threats Database (SPRAT), Department of Climate Change, Energy, the Environment and Water; • DoE, (2014a): Approved Conservation Advice for *Denisonia maculata* (Ornamental Snake). Canberra; • (DCCEEW, 2023): Draft Referral guidelines for the nationally listed Brigalow Belt reptiles. Canberra. Available at: www.environment.gov.au/epbc/; • Wilson and Swan (2020): A complete Guide to Reptiles in Australia. 6th edn. New Holland Publishers Pty Ltd; • (DSEWPC, 2011): Survey guidelines for Australia's threatened reptiles. Canberra. Available at: www.ag.gov.au/cca; and • Kerswell et al. (2020): Habitat descriptions for 12 threatened species, specific to central Queensland. Report for BHP.
• Quality and availability of habitat required for breeding and shelter;	• Presence of gilgai; • Amount of course woody debris present; and • Amount of cracking clay soils present.	
• Quality and availability of habitat required for mobility; and	• Distance to high-quality habitat • Appropriate landzone present (3 or 4); • Amount of course woody debris present; and • Amount of cracking clay soils present.	
• Absence of threats.	• Microhabitat destruction; • Predation from invasive species; • Decrease in available food; and • Decrease duration of inundation.	

Table 6 Attributes and indicators used to determine Glossy Black-Cockatoo habitat scores

Glossy Black-Cockatoo		
Attributes	**Indicators**	**References**
• Quality and availability of food and habitat required for foraging;	• Quantity of canopy occupied by *Casuarina* and/or *Allocasuarina;* • Proximity to water supply; and • Number of feed species present.	• Glossy Black Conservancy (2022): Glossy Black-Cockatoo Conservation Guidelines for South-eastern Queensland and Far North-eastern New South Wales. Cleveland, Queensland. Available at: www.glossyblack.org.au; • DCCEEW (2025): Species Profiles and Threats Database (SPRAT), Department of Climate Change, Energy, the Environment and Water; • (Hourigan, 2012): Targeted species survey guidelines: Glossy Black-Cockatoo *Calyptorhynchus lathami.* Brisbane; • (DEWHA, 2010): Survey guidelines for Australia's threatened birds. Canberra; and • Menkhorst et al. (2019): The Australian Bird Guide. CSIRO Publishing.
• Quality and availability of habitat required for breeding and shelter;	• Number of tree hollows present; • *Eucalyptus* forest present with a *Casuarina* and/or *Allocasuarina* subcanopy; and • Amount of disturbance to vegetation community.	
• Quality and availability of habitat required for mobility; and	• Number of tree hollows present; • Size of remnant vegetation and connectiveness in surrounding landscape; • Proximity to water supply; and • Number of feed species present.	
• Absence of threats.	• Fragmentation of habitat; • Reduction in hollow bearing trees; • Change of vegetation structure due to invasive flora species; and • Removal of nesting/feeding trees.	

3.0 Impact Assessment

3.1 Direct Impacts

EcoSM (2015) (**Appendix G**) ground-truthed vegetation communities and conservation significant species habitat within the HCOC ML4738 which was further supported by more recent surveys undertaken by SLR in 2022 and 2023. All impact assessment and offset calculations in this report are based on their ground-truthed habitat spatial data except for those minor changes identified in **Section 2.1**. Ground-truthed data is depicted in **Appendix B**.

A summary of the likely and/or known environmental matters identified within the study area that will be directly impacted are provided in **Table 7**.

Table 7 Environmental Matters within the Study Area

Environmental Matter	Type of matter for which significant residual impact was assessed	Habitat Quantity (ha)
Regulated Vegetation (of concern *Vegetation Management Act 1999* (VM Act) status)	MSES	15.0 ha of RE 11.3.4 82.1 ha of RE 11.4.2 4.0 ha of RE 11.9.4 171 ha of RE 11.9.7 **Total of 272.1 ha**
Regulated Vegetation within the defined distance of a watercourse	MSES	0.5 ha of RE 11.3.25a 4.0 ha of RE 11.3.4 0.8 ha of RE 11.4.2 8.1 ha of RE 11.9.2 10.9 ha of RE11.9.7 23.9 ha of RE 11.9.9 **Total of 48.2 ha**
Connectivity	MSES	**599.8 ha**
Squatter Pigeon (Southern) (*Geophaps scripta scripta*)	MSES and MNES (Overlapping prescribed matter)	**595.8 ha**
Koala (*Phascolarctos cinereus*)	MSES and MNES (Overlapping prescribed matter)	**595.8 ha**
White-throated Needletail (*Hirundapus caudacutus*)	MSES and MNES (Overlapping prescribed matter)	**N/A**[1]
Glossy Black-Cockatoo (*Calyptorhynchus lathami erebus*)	MSES	**0.5 ha**
Southern and Central Greater Glider (*Petauroides volans (syn. Petauroides volans volans))*	MSES and MNES (Overlapping prescribed matter)	**5.7 ha**

[1] White-throated Needletail is a migratory bird species that is completely aerial and therefore it's habitat cannot be specified.

Environmental Matter	Type of matter for which significant residual impact was assessed	Habitat Quantity (ha)
Ornamental Snake (*Denisonia maculata*)	MSES and MNES (Overlapping prescribed matter)	**83.5 ha**
Short-beaked Echidna (*Tachyglossus aculeatus*)	MSES	**599.8 ha**
Black Ironbox[1] (*Eucalyptus raveretiana*)	MNES	**2.0 ha**
SEVTs of the Brigalow Belt TEC	MNES	**4.0 ha**
Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	MNES	**0 ha**

1. At the time of submission this species was only listed under the EPBC Act but during the approvals process it was uplisted under the NC Act.

3.2 Indirect Impacts

Potential indirect impacts in the absence of appropriate mitigation measures include:

- Increased fauna mortality or injury via vehicle strike (vehicle movement is likely to increase, leading to an increased risk of animal collisions and increased mortality per collision);
- Facilitating pest animal movement into new areas;
- Introduction and spread of disease and pathogens;
- Increased noise, light, vibration and dust;
- Edge effects and disturbance to adjacent habitats;
- Groundwater drawdown;
- Sedimentation of adjacent habitats; and
- Introduction of new weed species or spread of existing weeds limiting fauna movement.

3.3 Avoidance

The Project mine plan has undergone several iterations, with avoidance and minimisation of impacts to environmental matters being a key consideration throughout the design process. During the planning stage there were versions of the mine plan which included joining Homevale and Exevale pits into a single pit which would have eliminated the watercourse downstream of Brumby Waterhole (BWH) and known habitat for many prescribed environmental matters. The mine plan was amended to separate the two pits to retain the watercourse and avoid additional impacts to multiple prescribed environmental matters that were not necessary for resource recovery.

Once a mine plan was determined an initial ecological survey was undertaken. The initial Project design totalled 707.3 ha of impact area. Areas where environmental matters overlapped with the design were identified and the mine plan was amended to avoid those matters as much as practical.

A reduction of 28.1 ha was incorporated into the final design with the majority situated around watercourses in Areas 1 - 3. These areas contain multiple overlapping environmental

matters including, regulated ecosystems within the defined distance of a watercourse, and habitat for Glossy Black-Cockatoo , Black Ironbox, Koala and Southern and Central Greater Glider. Area 4 was amended to entirely avoid direct impacts to endangered RE 11.9.5 that equates to the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. The change of design in Area 4 also reduced the overall impact to RE 11.9.4 that equates to the SEVTs of the Brigalow Belt (north and south) and Nandewar bioregions TEC. The current design footprint has been reduced as much as practical whilst still retaining the areas of the resource and required infrastructure (see maps in **Appendix B13**). Specific mitigation measures to further reduce impacts to each environmental matters where required are provided in **Section 3.4**.

3.4 General Mitigation Measures

To further reduce impacts to conservation significant species and communities, mitigation measures and practices in table 1 of HCOC's High Risk of Impact Species Management Program (EcoSM, 2021; **Appendix F**) will be applied. Additional mitigation measures for different stages of the Project have also been developed below (**Table 8**).

Table 8 Mitigation and control measures with some extracted from HCOC's High Risk of Impact Species Management Program (EcoSM, 2021) (relevant to the Project)

Controls/Measures		Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
Pre-construction							
1	Avoid disturbance of sensitive habitats, including riparian corridors and wetlands, Semi-evergreen Vine Thicket and Brigalow communities	X	X	X	X	X	X
2	Consider mechanisms to facilitate fauna movement through construction projects, such as retaining vegetated and riparian corridors.	X	X	X	X	X	X
3	Where possible, undertake vegetation clearing outside of breeding seasons and delay operations if breeding individuals or places are identified.	X	X	X	X	X	X
4	As part of the Ground Disturbance Process (GDP) at HCOC, assessment of habitat will be undertaken in the	X	X	X	X	X	X

	Controls/Measures	Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	planned work area. The GDP involves an initial inspection of the planned work area, during which, the following will be carried out: • Identification of ecological values, including potential animal breeding places (such as tree hollows and log piles), significant flora and fauna and sensitive areas; • Assessment of vegetation and survey/demarcation of clearing boundaries; and • Identification of any other specific area or permit conditions.						
5	A pre-clearing survey will be undertaken prior to vegetation clearing in all identified potential breeding habitat areas, by a suitably licensed and experienced spotter/catcher.	X	X	X	X		
6	Where occupied breeding places are identified, these are to be left undisturbed, marked and a buffer clearly established around this occupied breeding place. The buffer is to include the identified habitat/habitat tree and in the case of trees any surrounding trees whose canopy touches the habitat tree. A minimum 20 m buffer will be established for ground habitat features. The buffer is to remain in place to allow the	X	X		X		

	Controls/Measures	Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	breeding cycle to occur (i.e., young have fully fledged or left the breeding place). In these cases, the construction schedule may need to be modified.						
7	Complete pre-clearing surveys for Koala within one week prior to clearing vegetation to identify the presence of the species. A suitably qualified fauna spotter/ catcher must be present during clearing and used to relocating the identified species during clearing activities.			X			
8	Large mature trees, particularly eucalypt and *Corymbia* species, must be marked and retained (where possible) to provide wildlife habitat.	X	X	X	X		
9	Limits of clearing areas including 'no go zones' will be delineated with appropriate flagging material and/or barricade webbing as determined by the Environmental Specialist or Delegate.	X	X	X	X	X	X
10	Information regarding the risks of fauna injury and deaths and how to manage animals which are injured or displaced is to be included in HCOC site inductions and in toolboxes.	X	X	X	X	X	X
11	Where temporary fencing is required, give consideration to fauna movement, current land uses and worker safety requirements.			X	X		X
12	Readily available details of veterinarians and/or wildlife carers in case of	X	X	X	X	X	X

	Controls/Measures	Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	injury to animals during HCOC activities.						
13	All large (>50 cm DBH) Black Ironbox within the edges of areas to be cleared will be marked and avoided where possible.	X		X	X		
14	Adequate designs of watercourse crossings will be implemented to not impede water movement.		X	X		X	X
Vegetation Clearing							
15	Vegetation clearing protocols detailed in Appendix B of the HCOC High Risk of Impact Species Management Program are to be implemented during operations.	X	X	X	X	X	X
16	As part of routine pre-start meetings, work crews will be briefed on the locations of known or likely Endangered, Vulnerable and Near Threatened (EVNT), Short-beaked Echidna or Colonial Breeding places and unauthorised access to relocation areas.	X	X	X	X	X	X
17	In the event of injury to fauna, these fauna will be taken to a nearby suitably qualified and experienced wildlife carer or veterinarian immediately for treatment.	X	X	X	X	X	X
18	Signage will be erected to increase the general awareness of vegetation/habitat to be left undisturbed.	X	X	X	X	X	X
19	Areas in the project area identified as higher-risk Koala habitat, (as			X			

	Controls/Measures	Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	determined through site-specific risk assessment), additional controls should be implemented to reduce animal strike incidents. Controls could include: • Mobile plant speed limits must not exceed 60 km/hr; or • Suitable exclusion fencing be installed in high-risk areas.						
20	Prohibit clearing during extreme heat when temperatures exceed 40° Celsius.			X			
Construction							
21	A reduced speed limit will be implemented in nominated areas (as identified as part of the pre-clearing surveys) with appropriate signage.		X	X			X
22	Dust suppression measures, such as watering, will be implemented as required, particularly during adverse (i.e., dry and windy) conditions.	X	X	X	X	X	X
23	Continue invasive flora program and weed control program including weeds identified in the ecology assessment.	X	X	X	X	X	X
24	Maintain an annual feral dog, feral cat and fox control program within ML4738 and the offset area to minimise the predation of species.	X	X	X	X	X	X
25	Maintain annual fire breaks around the perimeter of ML4738 and the offset area, plus	X	X	X	X	X	X

	Controls/Measures	Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	internally within these areas to manage the incursion of wildfires.						
26	Review and deliver toolbox talks annually to ensure workers are aware of Koala, potential impacts and mitigation and management measures.			X			
27	Ensure trenches are backfilled as soon as possible to minimise the risk of fauna becoming trapped and injured. Leave branches and leaves in open trenches to allow fauna to escape or shelter.			X		X	
28	Inspect trenches, culverts and other structures daily prior to works and again prior to backfilling. Any trapped or injured native fauna species present are to be managed appropriately.			X		X	X
29	Vehicle activities shall be restricted to roads, access tracks and hardened surfaces to reduce potential injury or death to fauna.		X	X		X	X
30	In the event of injury to fauna, these fauna will be taken to a nearby suitably qualified and experienced wildlife carer or veterinarian immediately for treatment.	X	X	X	X	X	X
31	If barbed wire must be used in project fencing, replacing the top strand with plain fencing wire will reduce the risk of fauna injury and death.	X	X		X		
32	Temporary lighting shall be directed away from	X	X	X	X	X	X

	Controls/Measures	Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	retained habitat. Light shades and low lighting must be applied to construction and operational areas where located adjacent to retained habitats.						
33	Machinery will be maintained to reduce unnecessary noise.	X	X	X	X	X	X
34	Provide shielding on lighting equipment to reduce lighting spill into identified habitat areas.	X	X	X	X	X	X
35	Chemicals will be stored away from watercourses and chemical spill kits will be located on site.	X	X	X	X	X	X
36	Disturbance and land clearing during the wet season will be avoided where practical.	X	X	X	X	X	X
37	Water will be applied to trafficable surfaces and disturbed areas to reduce dust during construction.	X	X	X	X	X	X
38	Progressive clearing will be implemented.	X	X	X	X	X	X
39	A licensed fauna spotter/ catcher will be utilised during clearing activities.	X	X	X	X	X	X
40	If Koalas are observed during clearing, a 20 m buffer will be placed around the Koala. Clearing will no proceed in this buffer until the Koala has moved away on its own accord.			X			
41	Felled trees will be mulched as soon as practical to avoid colonisation of fauna.					X	X
42	Appropriate sediment and runoff controls will be implemented to avoid		X			X	

Controls/Measures		Glossy Black-Cockatoo	Squatter Pigeon (Southern)	Koala	Southern and Central Greater Glider	Ornamental Snake	Short-beaked Echidna
	damage to adjacent vegetation						
Operational							
43	Maintain those measures and procedures during the construction phase to reduce any excess dust.	X	X	X	X	X	X
44	Maintain those measures and procedures in the construction phase to reduce any excess noise and light.	X	X	X	X	X	X

3.5 Matters of State Environmental Significance

3.5.1 Regulated Vegetation

3.5.1.1 Of Concern and Endangered Regional Ecosystems

Clearing of REs with an 'Of concern' or 'Endangered' VM Act status that exceed relevant thresholds outlined within the Significant Residual Impact Guideline (DEHP, 2014) is a significant residual impact to this prescribed environmental matter. In such case, the provision of an environmental offset may be required under the Queensland environmental offset framework. These relevant thresholds for State-mapped and ground-truthed RE's within the study area by EcoSM (2015) (**Appendix G**) are detailed below.

A significant residual impact will occur to 'Of concern' or 'Endangered' REs with a sparse structural category within the study area if:

- Clearing for linear infrastructure is greater than 20 m wide; or
- Clearing for other than linear infrastructure is greater than 2 ha.

A significant residual impact will occur to 'Of concern' or 'Endangered' REs with a dense to mid-dense structural category within the study area if:

- Clearing for linear infrastructure is greater than 10 m wide; or
- Clearing for other than linear infrastructure is greater than 0.5 ha.

Table 9 provides the total impact area to each type of regulated vegetation that exceeded thresholds within the study area that will require an environmental offset. Regulated vegetation that require an environmental offset are shown in **Appendix B4**.

Table 9 Amount of 'Of Concern' and 'Endangered' Regulated Vegetation requiring an Environmental Offset

Regional Ecosystem	VM Act Class	Structural Category	Total Maximum Extent of Impact (ha)
RE 11.3.4	Of concern	Sparse	15.0
RE 11.4.2	Of concern	Sparse	82.1
RE 11.9.4	Of concern	Dense	4.0
RE 11.9.7	Of concern	Sparse	171

3.5.1.2 Regulated Vegetation within a defined distance of a Watercourse

There are several watercourse and drainage features relevant to the study area that are represented on the Vegetation Management Watercourse and Drainage Feature Map (**Appendix B5**). The defined distance (or extent to which the remnant vegetation associated with the watercourse is considered a prescribed environmental matter) is determined by the bioregional context and the stream order of the watercourse or drainage feature.

All of the vegetation communities located within the study area are classified as remnant RE's and therefore the extent of all ground-truthed vegetation communities within the defined distance of the banks of the State-mapped watercourse or drainage features is a prescribed environmental matter (**Appendix B5**). HCOC is located within a non-coastal bioregion and the relevant defining distances for REs associated with a watercourse are shown in **Table 10**.

Table 10 Defined distance for Regulated Vegetation associated with a Watercourse (non-coastal bioregions) as shown in the Queensland Environmental Offsets Policy V1.17

Stream order	Defined distance (m)
1 or 2	25
3 or 4	50

Significant residual impacts to this prescribed environmental matter are determined by the following criteria:

- Clearing occurs within 5 m of the defining bank of the feature; and
- The following area thresholds are exceeded:
  - Clearing for linear infrastructure within a sparse structural category RE is greater than 20 m wide; or
  - Clearing for other than linear infrastructure within a sparse structural category RE is greater than 2 ha; or
  - Clearing for linear infrastructure within a dense to mid-dense structural category RE is greater than 10 m wide; or
  - Clearing for other than linear infrastructure within a dense to mid-dense structural category RE is greater than 0.5 ha.



Table 11 provides the total impact area of each regulated vegetation associated with a watercourse that exceeded the above thresholds within the study area that will require an environmental offset.

Table 11 Regulated Vegetation within a defined distance of a Watercourse within the Study Area

Regional Ecosystem Associated with a Watercourse	Structural Category	Total Maximum Extent of Impact (ha)
RE 11.3.25a	Sparse	0.5
RE 11.3.4	Sparse	4.0
RE 11.4.2	Sparse	0.8
RE 11.9.2	Sparse	8.1
RE 11.9.7	Sparse	10.9
RE 11.9.9	Sparse	23.9

3.5.1.3 Protected Wildlife Habitat

Within the study area, ground-truthed habitat is mapped for Squatter Pigeon (Southern), Koala, Southern and Central Greater Glider, Ornamental Snake, Glossy Black-Cockatoo and Short-beaked Echidna (*Tachyglossus aculeatus*) (see maps in **Appendix B8-12**).

An area of habitat (foraging, roosting, nesting or breeding habitat) for an animal that is critically endangered, endangered, vulnerable or a special least concern animal is a prescribed environmental matter. The provision of an environmental offset will be required under the Queensland environmental offsets framework for a significant residual impact to this prescribed environmental matter.

Impact assessment and the determination of offsets requirements for this matter are discussed in **Section 3.6**.

Essential Habitat

Essential habitat is assessed as protected wildlife habitat for a resource activity. Essential Habitat for Ornamental Snake, Squatter Pigeon (Southern) and Southern and Central Greater Glider is State-mapped and ground-truthed within the study area. The clearing of essential habitat for these species is a prescribed environmental matter and was assessed against the Significant Residual Impact Guideline (DEHP, 2014).

Impacts and the determination if offsets are required to conservation significant species and their habitat is discussed in **Section 3.5.4**.

3.5.2 Connectivity Area

A significant residual impact to connectivity from the Project was identified for Test 1 using the LFC Tool as per section 3.0 of the *Significant Residual Impact Guideline* (DEHP, 2014). In addition to using the LFC Tool, the study area is also partially located within the terrestrial Statewide Biodiversity Corridor (SBC) buffer and is adjacent to the Homevale National Park (HNP). A total of 599.8 ha of connectivity areas will be significantly impacted and require an environmental offset.

3.5.3 Protected Areas

HNP is classified as a protected area under the Significant Residual Impact Guideline (DEHP, 2014). A significant impact to a protected area will occur if it will or is likely to result in one or more of the following:

- The authorised clearing or inundation of all or part of the protected area for the construction of private or publicly owned infrastructure on the area;
- The exclusion of, or reduction in, the public use or enjoyment of all or part of the protected area; and
- A reduction in the natural or cultural values of all or part of the protected area.

The development of the study area is not proposed to impact HNP (see maps in **Appendix B**). No portions of the study area border HNP. Area 3 is the closest to this protected area and is approximately 1.8 km northwest of HNP. No vegetation clearing or inundation will occur inside HNP as a result of the Project. Due to the distance to HNP, it is unlikely that any indirect impacts will occur from the development of the study area. Dust, light and noise may be short-term impacts but due to the distance to HNP, it is unlikely that any of these would lead to “a reduction in the natural or cultural values of all or part of the protected area”. Furthermore, the Project will in no way directly, or indirectly, lead to any exclusion of entry to the public.

BWH is located within a declared offset area and is culturally significant in the local area and occurs between Areas 2 and 3. Vegetation clearing will not occur in or immediately adjacent to BWH.

Groundwater modelling indicates that minor groundwater drawdown is likely in this area. A maximum decrease in groundwater has been modelled as a 1.5 m decrease near the lower pool reducing to 0.45 m decrease near the upper pool. However, a groundwater investigation undertaken by KCB (2025) found that the waterholes are unlikely to be fed by groundwater and therefore any reduction in groundwater will not impact the surface water levels of BWH.

Even if the waterholes were fed by groundwater, this level of reduction in groundwater is unlikely to affect the vegetation community (11.3.25a) around BWH as the dominant species (*Eucalyptus tereticornis, E. raveretiana* and *Lagunaria queenslandica*) are found throughout the local area in areas where surface water is not retained. It is unlikely that the small reduction in groundwater will have a significant impact on this feature, the surrounding vegetation community or to fauna that utilise this type of vegetation community.

3.5.4 Conservation Significant Species

This section includes an assessment of significant residual impacts to flora and fauna species protected at the State level in accordance with the *Significant Residual Impact Guideline* (DEPH, 2014) which classifies these species under protected wildlife habitat.

MSES Protected Wildlife Habitat (including essential habitat) for Endangered and Vulnerable Species

An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:

- Lead to a long-term decrease in the size of a local population;
- Reduce the extent of occurrence of the species;
- Fragment an existing population;

- Result in genetically distinct populations forming as a result of habitat isolation;
- Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species habitat;
- Introduce disease that may cause the population to decline;
- Interfere with the recovery of the species; or
- Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.

MSES Protected Wildlife Habitat for Special Least Concern (Non-Migratory) Species

An action is likely to have a significant impact on a special least concern (non-migratory) animal wildlife habitat if it is likely that it will result in:

- A long-term decrease in the size of a local population;
- A reduced extent of occurrence on the species;
- Fragmentation of an existing population;
- Result in genetically distinct populations forming as a result of habitat isolation; or
- Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.

3.5.4.1 White-throated Needletail

The White-throated Needletail (*Hirundapus caudacutus*) is listed as vulnerable under the NC Act. An individual of this species was observed once flying over the rock bar that crosses Hail Creek in the central portion of HCOC during assessments by EcoSM (2015). Another individual was recorded in November 2023 during monitoring of the existing Black Ironbox Offset area by SLR. However, as this species was not listed as vulnerable during the development of EcoSM (2015) report, an assessment of potential significant impacts to this species was not previously undertaken.

This trans-equatorial insectivorous species is a seasonal non-breeding visitor to Australia that inhabits aerial habitats from a height of <1 m to >1,000 m above the ground. As this is an aerial species, it is considered that conventional habitat descriptions are inapplicable. However, it is notable that this species commonly occurs over a variety of wooded to open habitat types. Foraging habitat for this species includes the aerial layers that it preferentially inhabits. Additionally, this species has been documented to roost in forest and woodland trees within Australia only on rare occasions (TSSC, 2019). Threats to this species within Australia include collision with wind turbines, overhead wires, windows, and lighthouses. However, the scale of these threats and their potential to impact this species at a population level requires further investigation. The use of insecticides, particularly organochlorines, has been suggested as a potentially contributing to a decline in this species in addition to vegetation clearing. These factors result in predominantly indirect impacts to this species through secondary poisoning after ingesting treated insects and a reduction of invertebrate prey. Vegetation clearing may also reduce the availability of roosting sites and therefore also contribute to the declines in this species. However, it is thought that the greatest risk to this species is logging of breeding habitat and hunting in Siberia, outside of Australia (TSSC, 2019; Tarburton, 2021).

An assessment of significant impact against MSES criteria is detailed in **Table 12**. Overall, it is considered that there will be no significant residual impact to this species as a result of development of the study area.

Table 12 Significant residual impact assessment for White-throated Needletail

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of a local population	It is unlikely that development of study area will lead to a long-term decrease in the size of any local population. This is suggested as this species does not breed within Australia, is completely aerial and occurs over a variety of habitat types (TSSC, 2019).
Reduce the extent of occurrence of the species	It is unlikely that development of study area will reduce the extent of occurrence of this species. This is suggested as this species has a broad non-breeding distribution throughout Australia and occurs over a variety of habitat types (TSSC, 2019).
Fragment an existing population	It is unlikely that disturbance in the study area will fragment the population of this species within Australia. This is suggested as this species is aerial in Australia and development of the study area is not likely to constitute a barrier to the dispersal of this species.
Result in genetically distinct populations forming as a result of habitat isolation	It is unlikely that disturbance in the study area will result in a genetically distinct population forming. This is suggested as this species is aerial and non-breeding in Australia (TSSC, 2019), and development of the study area is not likely to isolate any habitat for this species.
Result in invasive species that are harmful to the species becoming established in the species' habitat	No invasive species within Australia are identified to be harmful to this species as a whole due to the aerial habitats that this species predominantly occur within (TSSC, 2019). Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Introduce disease that may cause the population to decline	No disease is identified as potentially impacting this species within Australia (TSSC, 2019). Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Interfere with the recovery of the species	Development of the study area may reduce some infrequently used roosting habitat for this species. However, due to an abundance of other available roosting habitat within the broader region, it is unlikely that this will interfere with the recovery of this species.
Cause disruption to ecologically significant locations	The only ecologically significant location that the study area is likely to provide for this species is foraging habitat. However, as this species forages in the area above the study area, it is unlikely that development of the area will cause any significant disruption to the foraging habitat for this species.
Conclusion	**The Project is unlikely to result in a significant impact to this species.**

3.5.4.2 Glossy Black-Cockatoo

The Glossy Black-Cockatoo (*Calyptorhynchus lathami erebus*) is listed as vulnerable under the NC Act and an assessment of significant residual impact is undertaken in **Table 13**. No individuals of this species were detected within HCOC during previous ecological assessments by EcoSM (2015) despite 60 days in the field and approximately 270 person hours of searches. However, some watercourses within the MLs were identified by EcoSM (2015) to contain suitable habitat for this species, with some of these mapped areas occurring within the current study area. Due to the few foraging opportunities present in the study area and not recording this species within HCOC during field assessments, EcoSM determined that this species could visit the study area on rare occasions and it was unlikely to breed in the study area due to few hollows being recorded.

This sub-species occurs in Queensland from Dawson-Mackenzie-Isaac Rivers basin, north to the Connors-Clark Ranges, south to Dawes and Many Peaks Ranges and inland to the Expeditions, Peak and Denham Ranges, including the Blackdown Tablelands (Hourigan, 2012). Habitat for this species includes woodlands and forests dominated by *Casuarina* and *Allocasuarina* species under a *Eucalyptus* overstory. This species can traverse over 10 km in search of feed (*Casuarina* and *Allocasuarina*) and nesting trees (large eucalypts with hollows). Although this species can forage on nine different *Casuarina* and *Allocasuarina* species, they typically show a strong fidelity to particular species and individual feed trees in an area where they return year after year. This species required large old eucalypt trees with hollows for nesting. This species typically nests in close proximity to other nesting pairs and will use the same hollows on subsequent years (Hourigan, 2012). At HCOC, RE 11.3.25/a is mapped as habitat for this species due to some feed trees (*Casuarina cunninghamiana*) and sparse tree hollows in mature Black Ironbox being present (EcoSM, 2015). Feed trees were only located within this vegetation community, and few hollows were observed outside of this RE.

SLR ecologists undertook additional surveys in 2022 and 2023 identifying the abundance of feed trees and presence of tree hollows for this species and concluded similar results that feeding opportunities were only present in small areas of RE 11.3.25a due to occasional *Casuarina* being present. Assessments concluded that RE 11.3.25a in the study area typically contained three to four feed trees that were scattered in the canopy and subcanopy and on average only one small hollow was recorded. No evidence of this species, such as chewed *Casuarina* seeds was found during field assessments despite the fact that this species will feed and roost in the same areas over time. The closest area for a water supply was Brumby Water Hole, approximately 1.6 km to the northeast. This indicates some foraging but few breeding opportunities for this species in the study area. The majority of the study area is dominated by Narrow-leaved Ironbark (*Eucalyptus crebra)* that due to its wood density, doesn't typically form hollows. Vegetation communities on landzone 3 (alluvial soils) recorded sparse to moderate tree hollows, however, an increase in tree hollows were recorded in the southern portion of the ML on landzone 3. The study area occurs near the upper reaches of watercourses resulting in a decrease in the availability and duration of surface water flow and due to the few hollows observed in these areas its likely trees may take longer to reach a mature stage where hollows begin to form. Overall, few tree hollows were recorded and no evidence of this species foraging (orts on the ground under feed and nesting trees) or nesting was recorded in the study area. Due to this, RE 11.3.25a in the study area was classified as low quality for this species.

A significant impact assessment for this species, based on MSES criteria, was undertaken in EcoSM (2015) for the Hail Creek Transition Project which encompasses the current study area. Key outcomes of this assessment included that:

- Development of the area is unlikely to lead to a long-term decrease in the size of the local population;
- Low quality habitat for this species within the disturbance areas is unlikely to provide important habitat as the presence of preferred feed trees in this habitat area are not abundant. Therefore, it is unlikely that impacts to this low quality habitat will reduce the area of occupancy of this species;
- Development of the Hail Creek Transition Project area will not fragment the local population of this species as it is a highly mobile species and is likely to move throughout the landscape between preferred foraging areas;
- As no individuals of this species are likely to be impacted and this species is highly mobile, development of the Project is considered unlikely to affect gene flow of the local population;
- Development of the Project is unlikely to increase the threat of pest species that are harmful to the Glossy Black-Cockatoo. Additionally, development of the area is unlikely to introduce new weed species that are not already present and established in the area and broader region. However, it is recommended that a weed and pest species management plan be implemented for the Hail Creek Transition Project;
- Disease is not a known threat to this species. Therefore, development of the Hail Creek Transition Project area is unlikely to introduce any disease that may cause this species to decline; and
- Due to the relatively small number of feed trees within the broader area, it is unlikely that the disturbance area forms ecologically significant habitat for this species. Regardless, it is recommended that a Species Management Plan be implemented to include pre-clearance surveys to minimise any potential impacts to breeding places and individuals that may unexpectedly occur within the development area.

Overall, EcoSM (2015) suggest that there was no significant impacts to this species due to development of the Hail Creek Transition Project and the current assessment further supports this outcome for the study area. The design has been amended to avoid the majority of Glossy Black-Cockatoo habitat in the study area (SLR, 2025, **Appendix A**). The initial design impacted Glossy Black-Cockatoo habitat on the northeast portion of Area 1, the eastern edge of Area 2 and the western edge of Area 3. The design was amended to avoid these areas (see maps in **Appendix B13**); however, the design could not be amended further due to the location of the resource and not all impacts to this species could be avoided. The study area does overlap with Glossy Black-Cockatoo habitat in one area that could not be avoided, a small portion of Area 2 (0.5 ha) is RE 11.3.25a with some scattered *Casuarinas*. The small area of habitat within the study area (0.5 ha) is considered low quality due to few foraging species and few nesting opportunities being observed. As this is a highly mobile species, the majority of records in the local area do not occur west of the Great Dividing Range, the majority of habitat has been avoided by design and the remaining habitat is of low quality, it is unlikely that there will be a significant impact to Glossy Black-Cockatoo from development of the study area.

Table 13 MSES significant impact assessment for Glossy Black-Cockatoo

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of a local population	The study area intersects with Glossy Black-Cockatoo foraging habitat in one area, Area 2 (11.3.25a, 0.5 ha). The small amount of impact to Glossy Black-Cockatoo within Area

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
	2 has been greatly reduced from previous designs. Despite numerous field surveys, no nesting areas were recorded, and few hollow bearing trees were observed. As foraging and breeding opportunities within the study area are limited it is unlikely that the small amount of disturbance to this species habitat within the study area would lead to a long-term decrease in the size of the local population
Reduce the extent of occurrence of the species	HCOC is not located on the boundary of the know distribution of this species and there are few records in the broader area and none on the western side of the Great Dividing Range in the local area (ALA, 2025). The closest records are situated within Crediton State Forest approximately 16 km to the east of HCOC. HNP contains approximately 115,800 ha of remnant and connected vegetation communities with numerous records of this species (ALA, 2025) and is located adjacent to the project area. There is little habitat for this species within HCOC and where it is present, it is considered low quality due to the few feed trees present. Disturbance to 0.5 ha of low quality habitat for this species is unlikely to reduce the extent of occurrence.
Fragment an existing population	It is unlikely that disturbance to 0.5 ha of habitat for this species will fragment the population. As this is a highly mobile species (Hourigan, 2012), development of the study area is not likely to constitute a barrier to the dispersal of this species.
Result in genetically distinct populations forming as a result of habitat isolation	It is unlikely that disturbance to 0.5 ha of low quality habitat (few foraging or breeding opportunities present) will result in a genetically distinct population forming as this species is highly mobile.
Result in invasive species that are harmful to the species becoming established in the species' habitat	Some invasive species such as African Boxthorn (*Lycium ferocissimum*), Gazania (*Gazania rigens*), Buffel Grass (*Cenchrus ciliaris*) and other invasive grass species are known to reduce habitat quality for this species (Glossy Black Conservancy, 2022). It is unlikely that development of the study area would introduce detrimental invasive species that are not already present in the local environment or increase the density of invasive species in the local area. HCOC will continue to implement their weed monitoring program to reduce this potential impact. Additionally, HCOC monitors for invasive pest species (cats, fox, dingo) and implements control measures if any are recorded. This would further reduce the likelihood of the Project introducing or increasing the population of invasive species in the local area.
Introduce disease that may cause the population to decline	No disease is identified as potentially impacting this species within Australia (Hourigan, 2012). Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Interfere with the recovery of the species	No recovery plan has been developed for this species. Threats to this species include habitat loss, degradation and fragmentation. A total of 0.5 ha will be removed but due to its location adjacent to current mining activities it's unlikely that this area is utilised and the removal of this small area is unlikely to further fragment or degrade habitat in the local

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
	area. Overall, there is an abundance of similar vegetation communities that can provide foraging habitat within the broader region (QLD, 2025) where records also occur (on and east of the Great Dividing Range; ALA, 2025). It is unlikely that the removal of 0.5 ha of low quality foraging habitat will interfere with the recovery of this species.
Cause disruption to ecologically significant locations	The majority of records for this species occur in more suitable habitat along the Great Dividing Range (ALA, 2025) and visits to the study area by this species would be rare due to the low quality habitat present and few records in the local area. There is unlikely to be any ecologically significant locations for Glossy Black-Cockatoo within the study area due to the sparse occurrence of potential feed and nesting trees.
Conclusion	**Overall, the quality of habitat present with HCOC is considered low for Glossy Black-Cockatoo due to few foraging trees present and few mature trees that contain hollows. The small amount of impact (0.5 ha) is unlikely to result in a significant impact to this highly mobile species as no evidence of its occurrence in the study area has been recorded.**

3.5.4.3 Squatter Pigeon (Southern)

This species is listed as vulnerable under the NC Act. The species occurs in Queensland and northern New South Wales. In the north it hybridises with the northern subspecies (*Geophaps scripta peninsulae*) from the Burdekin-Lynd divide in southern Cape York Peninsula to the Charters Towers and Townsville area; it occurs near-coastally from Townsville to Lake Wivenhoe west of Brisbane and inland to Charleville, Barcaldine and Hughenden. Suitable habitats for the species are open-forests to sparse open-woodlands and scrub with the following characters (DCCEEW, 2025c; Lloyd *et al*., 2025):

- Predominance of trees or shrubs of the genera *Eucalyptus, Corymbia, Acacia* and *Callitris*. *Eucalyptus* and *Corymbia* species are more utilised and preferred compared to *Acacia* and *Callitris* (Lloyd *et al*., 2025);
- Within remnant and high-value regrowth vegetation, the groundcover and average ground vegetation cover ranges between 24 - 73 %;
- Suitable habitats within 1.7 km of a perennial water source are important for foraging and those within 1 km of a perennial water source are important for nesting (Lloyd *et al.*, 2025; TSSC, 2025). This includes large watercourses (stream order 4 and above), wetlands, livestock dams or livestock watering troughs;
- In the Brigalow Belt Bioregion, alluvial areas (landzone 3) contain preferred habitat;
- In suitable habitat, the landscape slope is gentle and is typically less than 3.3°(Lloyd *et al*., 2025); and
- *Eucalyptus* woodland and open woodlands with a grassy ground layer is required.

The species is ground-dwelling and has specific habitat requirements relating to vegetative structure and composition. Sparse, patchy ground cover, allowing freedom of movement while foraging on the ground, is preferred. This tends to consist of native perennial tussock grasses to approximately 33 % cover, with or without low shrubs and native forbs (the seeds

of some non-native forbs, such as *Stylosanthes* spp., are also eaten) and interspersed with bare, dusty ground, leaf litter and CWD. These habitats appear to provide the balance of openness to facilitate foraging, complexity to provide cover, and vantage points from which to view potential threats. New research by Lloyd *et al*. (2025) suggests that patchy groundcover can range between 24 - 73 % in suitable habitat.

Suitable habitats can be identified with some confidence by soil type. The preferred open forest to open woodland with a grassy ground layer habitat generally occur on well-draining gravelly, sandy or loamy soils. In Queensland, suitable habitats are generally limited to landzones 5 and 7 — sandy to loamy soils on low to gently rising or undulating plains and low lateritic escarpments. This species often occurs in burnt areas and, like many granivorous birds, is often encountered on tracks and roadsides (TSSC, 2025). Current studies have shown that landzone preference in the Brigalow Belt Bioregion is strongly correlated with landzone 3 (alluvial soils; Lloyd *et al*., 2025) but can also occur in a range of other landzones. As this species requires daily water, landzone 3 typically contains water sources in the environment. Suitable habitat within 1.7 km of a perennial source (large watercourse, wetland, cattle dams and troughs) is preferred and nesting habitat has been shown to occur closer to these water sources (<1 km). Slope has also been shown to be important with flat to gentle slopes of less than 3.3°preferred (Lloyd *et al*., 2025).

The Squatter pigeon (southern) is very rare in the south of its range (southern Queensland and New South Wales) and is affected by multiple pressures further north. Habitat clearing and fragmentation, including for agriculture, and grazing pressures, especially cattle grazing in the north and sheep grazing in the south, are the primary drivers of the subspecies' decline to date. These are ongoing pressures, though cattle grazing is considered less impactful than sheep grazing as some pasture improvement species are eaten by Squatter Pigeons and cattle grazing does not always involve vegetation clearing. Other current threats include grazing by feral mammals, predation by feral predators, transformation of habitats by weeds, fire regime change, and illegal shooting (TSSC, 2025).

This species was recorded within HCOC at several locations during previous ecological assessments by EcoSM (2015). Additionally, ground-truthing activities by EcoSM (2015) identify that all remnant vegetation, with the exception of RE 11.9.4 and RE 11.9.5, within the study area comprises potentially high-value habitat for this species. High-quality habitat was defined as areas with suitable groundcover species used for foraging, suitable groundcover density, distance to water sources and where the species was recorded during field assessments. RE 11.9.4 and RE 11.9.5 were considered to comprise low quality habitat due to these communities being considered too dense or waterlogged and less likely to be used by this species aside from movement between more suitable habitats (EcoSM, 2015). State-mapped essential habitat occurs within the study area for Squatter Pigeon (Southern) with all confirmed by field assessments. Avoidance options have been considered, however as the majority of the study area was ground-truthed as habitat for this species, avoidance measures were unable to be implemented to entirely avoid habitat for this species whilst still retaining the target resource. An assessment of significant impact is undertaken in **Table 14**.

Overall, development of the study area will impact upon 595.8 ha of an ecologically significant location for Squatter Pigeon (Southern). This includes impacts upon habitat that is used for breeding, feeding, nesting and resting which is a significant residual impact to this species and the provision of an environmental offset will likely be required.

Table 14 Significant impact assessment for Squatter Pigeon (Southern)

MSES vulnerable species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of a local population	HCOC is situated in the northern part of this species range, and this species is common in the northern portions of its range (TSSC, 2015). Broad areas of similar habitat occur outside of the ML, and it is unlikely that the development within the study area will lead to a long-term decrease in the size of the local population.
Reduce the extent of occurrence of the species	HCOC is situated in the northern part of this species range, and this species is common in the northern portions of its range (TSSC, 2015). Development within the study area is unlikely to reduce the extent of occurrence of this species as it has been recorded in various habitats surrounding the HCOC ML, including HNP, and the Project is not located near the edges of this species known range.
Fragment an existing population	It is unlikely that development within the study area will fragment an existing population as the study area is an extension of approved and/or existing disturbance and large areas of remnant vegetation that would be considered habitat for this species border the HCOC ML to the west, east and north.
Result in genetically distinct populations forming as a result of habitat isolation	Vegetation clearing will occur, however, connectivity will be retained to Hail Creek and to south and west of the HCOC ML No fragmentation of habitat will occur to do the project. As no fragmentation of existing habitat is likely to occur it is unlikely that any habitat for Squatter Pigeon (Southern) will be isolated leading towards a genetically distinct population.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	It is unlikely that development of the study area would introduce detrimental invasive species that are not already present in the local environment or increase the density of invasive species in the local area. HCOC will continue to implement their weed monitoring program to reduce potential impacts. Additionally, HCOC monitors for invasive pest species (cats, fox, dingo) and implements control measures if any are recorded. This would further reduce the likelihood of the Project introducing or increasing the population of invasive species in the local area.
Introduce disease that may cause the population to decline	There are no known diseases that impact upon this species, and it is unlikely that the development of the study area would introduce any diseases that would reduce the local population.
Interfere with the recovery of the species	Clearing of habitat within the study area is unlikely to interfere with the recovery of this species as large expanses of remnant vegetation occur outside of HCOC and this species is common throughout the northern portion of its range (TSSC, 2015).
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	The study area contains habitat that is used for breeding, feeding, nesting and resting for Squatter Pigeon (Southern). Similar habitat is found in the local area however a disruption to ecologically significant locations within the study area will occur from development of the study area.



MSES vulnerable species criteria for significant impacts	Response to criteria
Conclusion	**Development within the study area will impact upon 595.8 ha of habitat that is used for breeding, feeding, nesting and resting which is a significant residual impact to this species and the provision of an environmental offset will likely be required.**

3.5.4.4 Koala

Koala is listed as endangered under the NC Act. This is a nocturnal, tree-dwelling, obligate folivore (leaf eater) with a highly specialised diet. The diet of this species is defined by the availability and palatability of a limited variety of *Eucalyptus*, *Corymbia* and *Angophora* species. Across Australia, this species has a wide distribution across the eastern and southern States. Within Queensland, this species occurs in patchy and often low-density, widespread and fragmented populations. It is estimated that approximately 79,264 individuals of this species occur across Queensland, approximately 11,071 of these within the Brigalow Belt (south) Bioregion at a density of approximately 0.0005 Koalas/ha across Queensland. Home ranges of individuals of this species are highly variable (3 to 500 ha) and is dependent on life history stage, soil fertility, habitat and quality and nutritional requirements. Individuals of this species spend significant periods of time moving across the ground between food and shelter trees (>400 different tree species). Preferred tree species differ depending on habitat type and location across their range. The above information was obtained from DCCEEW (2025).

Koala reproduction is heavily influenced by seasonality, and the breeding season differs between northern and southern populations. This species is a marsupial, bearing pouch-young (joeys) (DCCEEW, 2025).

Habitat critical to the survival of this species is described in DCCEEW (2025) as the areas that the species relies on to avoid or halt decline and promote the recovery of the species. Under the EPBC Act, the following factors and any other relevant factors may be considered when identifying habitat that is critical to the survival of the species:

- Whether the habitat is used during periods of stress (e.g., flood, drought or fire);
- Whether the habitat is used to meet essential life cycle requirements e.g., foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes);
- The extent to which the habitat is used by important populations;
- Whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development;
- Whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements;
- Whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation; or
- Any other way in which habitat may be critical to the survival of a listed threatened species or a listed TEC.

Recent studies (Dique *et al.*, 2003; Melzer *et al.*, 2014; Rhodes *et al.*, 2015; Cristescu *et al.*, 2019; Menkhorst *et al.*, 2019; Youngentob; Marsh & Skewes, 2021) have characterised important Koala habitat as:

- An area with high diversity and abundance of suitable food trees (including locally unique food trees);
- A ground layer that allows individuals to move freely between trees;
- Proximity to watercourse or drainage channel;
- Undisturbed primary forests (including little to no past logging); and
- Presence of Koala signs.

DCCEEW (2025) describes climate sensitive populations of this species, which equate to important populations of this species. This is because Koalas at the western edge of their range are being impacted by shifts in rainfall patterns and increasing frequency of drought and heat stress resulting directly from climate change. The western edge populations are characterised by low population density and a high level of isolation from other populations. Therefore, they are increasingly vulnerable to environmental change and habitat loss. The western-edge populations were identified as potentially containing adaptive genes to environmental stressors indicating they have high conservation value.

Numerous severe threats impacting this species are described in DCCEEW (2025). These are:

- Loss of climatically suitable habitat;
- Increased intensity/frequency of drought;
- Increased intensity/frequency of heatwaves;
- Increased intensity/frequency of bushfire;
- Declining nutritional value of foliage;
- Clearing and degradation of Koala habitat;
- Encounter mortality of vehicles and dogs;
- Koala retrovirus (KoRV); and
- *Chlamydia* (*Chlamydia percorum*).

This species was identified to occur at eight locations within HCOC during previous ecological assessments by EcoSM (2015). Two of these previous observations occurred within the current study area. Assessments undertaken in EcoSM (2015) identify that all habitat within HCOC is considered critical habitat for the Koala.

The majority of the current study area is mapped as habitat for Koala (EcoSM, 2015). Due to the amount of records in and around the study area and the vegetation communities present, all remnant vegetation is considered high quality habitat for this species. The exception is RE 11.9.4 which due to its floristic structure, density and diversity is unlikely to be utilised by Koala. Within the study area, riparian areas are considered the highest quality habitat for this species due to the density of the vegetation, the floristic structure and diversity present and the increased leaf moisture due to semi-permanent water being available. RE 11.3.25a contained an important tree species for Koala, *Eucalyptus tereticornis,* as well as ancillary habitat tree species such as *Corymbia tessellaris, Acacia salicina* and *Melaleuca bracteata* (Youngentob, Marsh and Skewes, 2021). Other areas of Koala habitat within the study area, although still considered critical habitat for this species are of lower quality compared to riparian areas as they occur in open woodlands with reduced connectivity between canopies, are further away from semi-permanent water, which results in lower leaf moisture, and are modified areas for livestock grazing. Although the open woodlands are lower quality compared to riparian areas, the majority of previous observations of Koala occurred in these

open woodland communities indicating this habitat type is highly utilised by this species. These areas recorded some important Koala trees such as *Eucalyptus crebra*, *E. orgadophila, E. populnea* and *E. tereticornis* and ancillary species such as *Corymbia dallachiana, C. tessellaris* and *Acacia salicina* (Youngentob, Marsh and Skewes, 2021).

Additional surveys for Koala were conducted at each BioCondition and Habitat Condition site in the study area as well as when walking or driving between sites in the immediate surrounds of HCOC by SLR between 2022 and 2023. These included additional ecological assessments in the study area in November 2022 and March 2023. In the HCOC ML, fauna monitoring was conducted in both of the existing offset areas (the 2015 Biodiversity Offset Area and the Black Ironbox Offset Area) in November 2023 and baseline assessments were also conducted in the proposed offset area (Lot 13 on plan WHS466, see **Section 6.3**) adjacent to HCOC in November 2023. The outcomes of these additional surveys confirmed that Koala utilise various eucalypt dominated communities in and immediately surrounding HCOC. Multiple Koala were recorded during these assessments, mainly in REs 11.3.4, 11.3.25, 11.3.25a, 11.3.27, 11.9.9, 11.11.15. The same REs or those with a similar floral composition and structure ground-truthed in the study area include REs 11.3.4, 11.3.25a, 11.4.2, 11.9.2, 11.9.7 and 11.9.9 which are considered high quality habitat for this species at HCOC. It is likely that Koala in the Hail Creek general area utilise the vegetation communities on alluvial soils (vegetation communities on landzone 3) during drier periods where leaf moisture is higher and disperse from these areas into the surrounding landscape (vegetation communities on landzones 4, 9 and 11) during more preferrable climate conditions.

A SBC occurs on the northern part of the ML running east to west. This SBC connects HNP with other areas of remnant vegetation further to the west. It should be noted that the various portions of the study area do not directly connect to HNP and only the SBC and its associated buffers connect these areas. Lot 13 on plan WHS466 (the proposed offset area) incorporates large portions of the SBC and lies between Areas 1, 2 and 3, and HNP. The majority of the SBC around HCOC consists of strongly undulating terrain following a ridge line that originates in HNP to the east and traverses to the north and west of HCOC. Parts of the buffer zone of this SBC occurs in the northern portion of the HCOC ML in previously approved and active mining areas. The buffer zone of this SBC also includes portions of the study area; Areas 1, 2 and 3. During the numerous previous surveys, Koala were recorded in the SBC buffer zone. The majority of these records are associated with riparian vegetation. Riparian areas in the northern part of the ML are small tributaries of Hail Creek and maintain connectivity between important environmental features, namely Hail Creek, BWH and the SBC. Although the majority of Koalas were recorded in riparian areas, some Koalas were recorded in more open and arid eucalypt woodlands associated with landzones 9 and 11. It is likely that riparian vegetation acts as a refuge and is utilised throughout the year. During more favourable conditions, Koala disperse to more arid vegetation communities dominated by *Eucalyptus* species.

Currently, the buffer zone of the SBC, where it occurs in the HCOC ML, consists mainly of active mining and previously approved mining areas. Areas 1, 2 and 3 form a small part of the extensive disturbance within the northern portion of the ML. Connectivity north to south along Hail Creek for Koala is already restricted due to existing haul roads bisecting Hail Creek in multiple places. These existing barriers to connectivity through Hail Creek are currently isolating Koala habitat that occurs in the central portion of Hail Creek within the ML. The study area is an extension of the previously approved mining areas, but it is unlikely that it will impact connectivity for Koala more than what is already present. Connectivity in the northern portion of Hail Creek, BWH and the SBC will be maintained. Development of Areas 1, 2 and 3 will remove high quality Koala habitat that is used for feeding and dispersal through the local area likely during favourable environmental conditions, however,

watercourses and riparian vegetation will be avoided that will allow for ongoing connectivity through the local landscape. In particular, BWH and its associated watercourse are avoided with the current design which maintains existing connectivity for Koala between the adjacent proposed offset area, BWH and Hail Creek. The existing restricted connectivity values north and south along Hail Creek and patches of isolated Koala habitat between existing haul roads will not change with development of the study area. These existing connectivity issues are temporary and rehabilitation of the haul roads where they bisect Hail Creek will occur after the life of mine to re-establish connectivity from north to south through the HCOC ML.

Due to previously approved mining areas and extensive clearing for livestock grazing, connectivity of Area 4 is currently restricted. Area 4 is an extension of a previously approved mining area and the property abounding to the east has been extensively cleared for livestock grazing. This has already effectively cut off the southern portion of the ML, including Area 4, from HNP. Some connectivity values currently exist between Area 4 and Hail Creek; however, existing haul roads occur upstream that reduce connectivity for Koala north and south on Hail Creek. Development of Area 4 will remove high quality habitat that is used for feeding and dispersal. Although habitat for Koala will be removed, the connectivity values around Area 4 will be unchanged. Similar habitat will be retained to the west of Area 4 where is joins to Hail Creek. Riparian corridors along Hail Creek to the west and south are unimpeded by HCOC while existing haul roads likely reduce connectivity values north towards Areas 1, 2 and 3. Development of Area 4 will not change connectivity values for Koala. These existing connectivity issues are temporary and rehabilitation of the haul roads where they bisect Hail Creek will occur after the life of mine to re-establish connectivity from north to south through the HCOC ML.

A significant residual impact assessment is provided below (**Table 15**). Results from this specific assessment are similar to those provided within EcoSM (2015) for the broader Hail Creek Transition Project area, indicating that impacts to Koala habitat, which occurs throughout the majority of the study area, are difficult to avoid. The clearing of 595.8 ha of high quality Koala habitat will cause a significant residual impact to this species as it will cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites). Although the final landform will impact Koala habitat, the majority is considered dispersal habitat during optimal environmental conditions and riparian areas that provide connectivity between important areas will be maintained. Avoidance options have been considered, however as the majority of the study area was ground-truthed as habitat for this species, avoidance measures were unable to be implemented to entirely avoid habitat for this species whilst still retaining the target resource. Mitigation measures for Koala can be found in **Section 3.4** which include establishing no go zone when Koala are encountered prior to vegetation clearing commencing. The provision of an environmental offset will likely be required. To help protect the majority of the SBC around HCOC, the proposed offset area for this project has been nominated on Lot 13 on plan WHS466 that borders the northern portion of HCOC. This area is a key link of the SBC and connects HNP to vast tracks of remnant vegetation to the west and to the northern tributaries of Hail Creek. This area also recorded numerous Koala during baseline assessments in various eucalypt dominated communities. Securing this area as an offset will protect connectivity in the local and broader area.

Table 15 Significant impact assessment for Koala

MSES endangered species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of a local population	The proposed action will impact Koala habitat; however, extensive areas of similar vegetation communities occur in the local region that likely contain similar habitat qualities to those

MSES endangered species criteria for significant impacts	Response to criteria
	found in the project area. HNP contains approximately 115,800 ha of remnant and connected vegetation communities with numerous Koala records (ALA, 2025) and is located adjacent to the project area. Impacts to Koala habitat at HCOC constitutes approximately 0.5 % of remnant vegetation communities associated with HNP alone and additional remnant vegetation communities occur immediately to the north and west of HCOC. There is a potential decrease in the local population, yet it is considered unlikely a long-term decrease will occur due to the extensive areas of connected habitat that occur in the broader landscape.
Reduce the extent of occurrence of the species	Koala occur from North Queensland south to Victoria and South Australia. The proposed action will impact 595.8 ha of Koala habitat, however, it is unlikely that it will reduce the extent of occurrence of Koala as HCOC is not located near an edge of this species' known distribution. There are numerous records to the north, south, east and west of HCOC. The majority of Koala records in the local area occur throughout the Great Dividing Range to the east of HCOC, associated with vast areas of remnant vegetation. As large areas of remnant vegetation will be retained in the local area maintaining connectivity, it is unlikely that removal of habitat with the HCOC ML will reduce the extent of occurrence of the species in the local area.
Fragment an existing population	The disturbance to Koala habitat is unlikely to fragment a population as individuals will be able to move throughout the wider landscape through retained riparian areas. In the local area, remnant vegetation associated with the Great Dividing Range to the east of HCOC contains numerous records of Koala, the majority of this area overlaps with a SBC that occurs from east to west. Part of the buffer zone of the SBC that occurs in the HCOC ML will be impacted by the Project. However, vast tracts of remnant vegetation occur to the east, north and west of HCOC that maintain the core of the SBC. The proposed offset area for this project, on Lot 13 on plan WHS466, incorporates the majority of the SBC outside of the HCOC ML. This proposed offset area will protect and enhance the SBC and maintain connectivity between the SBC, HNP and BWH. As the vast areas of remnant vegetation outside of the ML are not to be impacted, but protected by an offset, it's unlikely that the local population will be fragmented by the Project.
Result in genetically distinct populations forming as a result of habitat isolation	The disturbance to Koala habitat is unlikely to isolate a population as individuals will be able to move throughout the wider landscape. It is unlikely that the amount of clearing of Koala habitat in this area would isolate habitat resulting in a genetically distinct population.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	The study area is located within a modified grazing landscape where introduced plants and animals (Dingo, Feral Cat, Rabbit, Pig, Cane Toad and Brumby) have previously been identified (EcoSM, 2015). Overgrazing from domesticated herbivores and habitat degradation through invasive pasture improving species are recognised as current threats for this species. However, as the proposed action occurs within areas currently utilised for cattle grazing it is unlikely the proposed action will introduce

MSES endangered species criteria for significant impacts	Response to criteria
	additional invasive species or increase the presence of such species. Pest fauna species management is currently implemented for cats, fox and dingos and will continue to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the population to decline	Throughout the entirety of the species distribution, with the exception of populations from South Australia and French Island (Victoria), Koalas are impacted by chlamydia (DAWE, 2022b). Another disease identified to impact Koalas is the KoRV and up to 100% of Koalas in Queensland and New South Wales are identified to have KoRV (DAWE, 2022a). Due to the lack of recent records, there is no information available on disease prevalence for the local area of the proposed action. However, as chlamydia and KoRV is identified to impact populations of Koala across significant portions of its overall range it is unlikely that the proposed action will introduce further disease that would cause the species to decline within the local or broader area. Although not known to occur in the local area, phytophthora root fungus is a fungal disease that is known to impact on the health of eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in eucalypts, which this species relies on. Therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. Sufficient facilities and equipment are provided at HCOC and due to this it is unlikely that that there will be a decline in Koala due to introduced disease.
Interfere with the recovery of the species	The main objectives that are set out for the recovery of Koala (DAWE, 2022b) include: • The area of occupancy and estimated size of population that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased; • The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased; • Metapopulation processes are maintained or improved; and • Partners, communities and individuals have a greater role and capability in listed Koala monitoring, conservation and management. The removal of Koala habitat within the study area has the potential to reduce the size of the local population to at least a small extent which may interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding,	It is likely that habitat within the study area represents part of an ecologically significant location for breeding, feeding and resting

MSES endangered species criteria for significant impacts	Response to criteria
feeding, nesting, migration or resting sites) of a species	for Koala during optimal environmental conditions. Impacts to Koala habitat within the study area will cause a significant impact to ecologically significant locations for Koala, however, areas of connectivity (riparian habitat) will be retained.
Conclusion	**Impacts to 595.8 ha of Koala habitat within the study area will be unavoidable and will cause disruption to ecologically significant locations (breeding, feeding and resting sites) for this species and potentially reduced at least to a small extent a local population. A significant residual impact will occur to Koala from development of the study area.**

3.5.4.5 Southern and Central Greater Glider

Southern and Central Greater Glider (*Petauroides volan*) is listed as endangered under the NC Act and habitat for this species is mapped within the study area. Significant impact assessments for this species from development of the study area are detailed in **Table 16**.

The Southern and Central Greater Glider has recently been split from the nominate species (*Petauroides volans*) (McGregor *et al.*, 2020;.DCCEEW, 2016) As such, little specific information is currently available for this new species. However, the life history traits and habitat requirements of the Southern and Central Greater Glider remain similar to the nominate species and therefore habitat requirements and threats remain similar. Therefore, the relevant listing advice for the nominate species is relevant to the Southern and Central Greater Glider and will be referenced in this report in lieu of more species-specific information.

This species inhabits eucalypt-dominated coastal low open forests to tall forests in the ranges and low woodlands west of the Great Dividing Range (DCCEEW, 2022). Typically, this species is found in highest abundance in tall, montane, moist eucalypt forests with relatively old trees and abundant hollows, although distribution may be patchy even in suitable habitat. Home ranges of this species are typically relatively small, although ranges are larger in low-productivity forests and more open woodlands (DCCEEW, 2022). This is a folivorous species that primarily feeds upon eucalypt leaves and favours environments where multiple eucalypt species are present to account for seasonal variation (DCCEEW, 2022). The species is particularly vulnerable to habitat fragmentation as they require two to four dens for every 2 ha of suitable habitat and have low dispersal ability (DCCEEW, 2022). The Greater Glider is also sensitive to logging and wildfire and is slow to recover following major disturbance.

This species was recorded multiple times within HCOC during previous surveys by EcoSM (2015) and during monitoring of the existing offset areas in 2024 and 2025 by SLR. RE 11.3.25a is considered high-quality habitat for this species due to the floristic complexity, density, presence of hollow bearing trees and records of this species occurring either in or immediately adjacent to this vegetation community. It should be noted that the quality of RE 11.3.25a is not homogenous and changes throughout the ML. The southern portions of Hail Creek in the ML receives more surface water flows for a longer duration than the same vegetation community in the norther portion of the ML. This results in a much larger watercourse bed, larger and more mature trees that contain hollows and increased habitat features for Southern and Central Greater Glider. This species was encountered by SLR multiple times during monitoring of the existing offset areas at HCOC (southern portion of the ML) in large Blue Gum (*Eucalyptus tereticornis*) stands and numerous large hollows were observed. EcoSM (2015) recorded this species along most main channels of Hail Creek but

was absent in the northern reaches and smaller tributaries. Within the study area, RE 11.3.25a occurs in the upper reaches of Hail Creek which likely results in a decrease in the availability and duration of surface water and trees may take longer to reach a mature stage where hollows begin to form as per the results of the field assessments. Although this species may have high quality foraging habitat throughout RE 11.3.25a, breeding opportunities in the study area are limited as few mature trees bearing hollows were recorded. The middle and southern sections of Hail Creek contain a greater abundance of mature trees that contain hollows. These areas are likely utilised for breeding by this species and occur outside of the study area. The majority of the study area is dominated by open *Eucalyptus crebra* woodlands that typically don't form hollows, and few were recorded in the study area. Vegetation communities dominated by *E. crebra* are not considered to be breeding habitat for this species and *E. crebra* is not a preferred foraging species unless immediately adjacent to watercourses where leaf moisture would be higher. Vegetation communities on landzone 3 (alluvial soils) recorded sparse to moderate amounts of tree hollows, however, the majority were recorded in the central and southern portions of the ML where taller more mature trees occurred. Due to the location of study area, the vegetation communities on the upper reaches of Hail Creek or on small tributaries contained fewer tree hollows. An impact assessment under the MSES endangered species guidelines is provided below (**Table 16**).

The Project design has been amended to avoid Southern and Central Greater Glider habitat where possible including areas of connectivity between Areas 2 and 3 (SLR, 2025, **Appendix A**). The initial Project design impacted Southern and Central Greater Glider habitat on the northeast portion of Area 1, the eastern edge of Area 2 and the western edge of Area 3. The design was amended to avoid these areas (see maps in **Appendix B13**). Avoidance measures were unable to be implemented to entirely avoid habitat for this species whilst still retaining the target resource. The final design impacts a total of 5.7 ha (0.5 ha of RE 11.3.25a, 5.2 ha of RE 11.3.4) of habitat for this species that could not be avoided, of which is considered high quality habitat. These small polygons of RE 11.3.25a and 11.3.4 (Area 2) are unable to be avoided. The polygon of RE 11.3.25a is small (0.5 ha) and is the northern extent of a much larger polygon that is to be avoided. RE 11.3.4 occurs adjacent to a polygon of RE 11.3.25a with approximately half of the polygon avoided by design. As the remaining portion of RE 11.3.4 connects to RE 11.3.25a that maintains connectivity to BWH and Hail Creek, it's unlikely that small reduction will impact Southern and Central Greater Glider. Connectivity in these areas are to be retained. It is unlikely that the small amount of clearing of RE 11.3.25a or 11.3.4 would significantly impact this species.

There are other portions of the study area that recorded the same vegetation communities, however, these areas are surrounded by open woodlands that isolate these areas, and its unlikely Southern and Central Greater Glider can access these areas. One is located within Area 2 (1.7 ha of RE 11.3.4) and the other within Area 4 (9.8 ha of RE 11.3.4). These areas contain some foraging habitat for this species but few tree hollows occur and due to their isolated locations and that no records occur in these areas, it's unlikely that these areas can be utilised by this species. Both of these areas are situated away from other areas of habitat and due to their location on small tributaries, it's unlikely that Southern and Central Greater Glider can reach these isolated areas of foraging habitat and impacts to these polygons would unlikely cause a significant impact to this species. Due to this, these areas are considered to be of low quality to the species. The remainder of habitat within Areas 1 - 4 (5.7 ha) occur as numerous small edges of much larger areas of habitat that will be avoided. As impacts will only occur to small edges of habitat, connectivity has been maintained within riparian vegetation and it's unlikely that impacts to these small areas scattered within Areas 1 - 4 will significantly impact this species. It is unlikely that the Project will significantly impact Southern and Central Greater Glider.

Table 16 Significant impact assessment for Southern and Central Greater Glider

MSES endangered species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of a local population	The proposed action will impact a total of 5.7 ha of high quality Southern and Central Greater Glider habitat. It is unlikely that the small amount of clearing in Area 2 would lead to a long-term decline of this species as the reduction occurs at the terminus of larger polygons and connectivity will be retained. All upstream and downstream habitat will be retained.
Reduce the extent of occurrence of the species	The proposed action will impact a total of 5.7 ha of Southern and Central Greater Glider habitat but will not reduce the extent of occurrence of this species as HCOC is not located on the edge of this species distribution. This species occurs along the Great diving range and in drier habitats to the west of the Great Dividing Range it is more confined to more dense and moist vegetation types, namely riparian vegetation. Extensive areas of similar vegetation communities occur in the local region that likely contain similar habitat qualities to those found in the project area. HNP contains approximately 115,800 ha of remnant and connected vegetation communities with numerous Southern and Central Greater Glider records (ALA, 2025) and is located adjacent to the project area. Impacts to Southern and Central Greater Glider habitat at HCOC constitutes approximately 0.00005 % of remnant vegetation communities associated with HNP alone and additional remnant vegetation communities occur immediately to the north and west of HCOC. These areas of remnant vegetation will be retained that will allow for continued connectivity for this species in the local area.
Fragment an existing population	It is unlikely that the small amount of clearing of 5.7 ha would fragment an existing population as no clearing will create a barrier to this species. The polygon of RE 11.3.25a is small (0.5 ha) and is the northern extent of a much larger polygon that is to be avoided. RE 11.3.4 occurs adjacent to a polygon of RE 11.3.25a with approximately half of this polygon avoided by design. The remaining portion of RE 11.3.4 connects to RE 11.3.25a that maintains connectivity to BWH and Hail Creek.
Result in genetically distinct populations forming as a result of habitat isolation	It is unlikely that the small amount of clearing would fragment or isolate an existing population anymore than what currently occurs and no clearing will create a barrier to this species. The polygon of RE 11.3.25a is small (0.5 ha) and is the northern extent of a much larger polygon that is to be avoided. RE 11.3.4 occurs adjacent to a polygon of RE 11.3.25a with approximately half of this polygon avoided by design. The remaining portion of RE 11.3.4 connects to RE 11.3.25a that maintains connectivity to BWH and Hail Creek. It is unlikely that the proposed project will result in genetically distinct populations.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	The study area is located within a modified grazing landscape where introduced plants and animals have been identified EcoSM (2015). Threats from invasive species includes predation by feral cats and foxes and increased fuel loads from invasive flora species that increase the frequency and/or intensity of fires. As the study area is maintained as livestock grazing it is unlikely that the Project will introduce any additional invasive flora species or increase the presence of such species. The current weed monitoring program will be maintained to reduce any risk of non-native flora species being

MSES endangered species criteria for significant impacts	Response to criteria
	introduced or increasing in density. Additionally, pest species management of cats, fox and dingo's will continue to be implemented to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the population to decline	There are no known diseases that are a direct threat to this species. Phytophthora root fungus is a fungal disease that is known to impact on the health of eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in eucalypts, which this species relies on. Therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. The washdown of machinery and equipment is critical to reducing the spread of this disease. Sufficient facilities and equipment is provided at HCOC for the washdown of machinery and vehicles and due to this it is unlikely that that there will be a decline in Southern and Central Greater Glider due to introduced disease. Additionally, the current weed management activities will be continued to reduce the potential of novel species or increased densities occurring.
Interfere with the recovery of the species	It is unlikely that development within the study area will interfere with the recovery of this species; although, clearing of high-quality habitat has the potential to interfere with the following listed recovery objectives in the conservation advice (DCCEEW, 2022). • Protect and maintain sufficient areas of suitable habitat, including denning and foraging resources and habitat connectivity, to sustain viable subpopulations through the species' range; and • Avoid fragmentation and loss of habitat due to development of new transport corridors. Include consideration of the species in planning processes, and where possible re-locate recreational activities and roads away from habitat. However, the polygon of RE 11.3.25a (Area 2) is small in size (0.5 ha) and is the northern extent of a much larger polygon. Similarly, the portion of RE 11.3.4 in Area 2 (5.2 ha) is the terminus of a polygon with the remainder connected to riparian vegetation that connects BWH to Hail Creek. Due to its size and location, its unlikely to be a "sufficient area of suitable habitat" and would not lead to any fragmentation of Southern and Central Greater Glider habitat. Overall, it is unlikely that the small amount of clearing will interfere with the recovery of this species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	DCCEEW (2025) states that habitat critical to the survival of the species which is equivalent of an ecologically significant location is: • Large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species preferred food species in a particular region;

MSES endangered species criteria for significant impacts	Response to criteria
	• Smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization; • Cool microclimate forest/woodland areas (e.g., protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes); • Areas identified as refuges under future climate changes scenarios; and • Short-term or long-term post-fire refuges (i.e., unburnt habitat with or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas. The proposed action will impact a total of 5.7 ha of high-quality Southern and Central Greater Glider habitat in Area 2. The removal of these small polygons are unlikely to be a significant impact to an ecologically significant location as the removal will not impact connectivity and movement and these polygons are not part of a refuge for this species. It is unlikely that impacts to 5.7 ha of habitat that occurs as small portions of much larger polygons that will be retained, will cause disruption to ecologically significant location.
Conclusion	**Portions of habitat for this species including areas of connectivity have been avoided by design and other portions are isolated in the local environment and its unlikely that Southern and Central Greater Glider can access these areas. There is 5.7 ha of high-quality habitat in Area 2 that was unavoidable. It is unlikely that impacts to these areas of habitat will significantly impact this species as this habitat occurs as two edges of much large polygons that will be retained. Connectivity in both areas will be retained due to adjacent riparian habitat. Due to the small amount of clearing required, it is unlikely that the extent of impact to Southern and Central Greater Glider habitat from the Project would be considered significant.**

3.5.4.6 Ornamental Snake

This species is listed as vulnerable under the NC Act. This species occurs in the Brigalow Belt bioregion with the core of this species distribution situated within the Fitzroy and Dawson Rivers drainage (DCCEEW, 2025). Preferred habitat for this species occurs in alluvial soils with deep cracks to shelter in and allows for the prevalence of its prey species, frogs. Habitat also occurs on the edges of wetlands, gilgai and moist areas in woodlands and open forests. This species is typically recorded in RE 11.4.3 but has been recorded in other RE's such as 11.4.6, 11.4.8, 11.4.9, 11.3.3 and 11.5.16. Within these vegetation communities, the following microhabitat features stated in DCCEEW (2025) are required:

- They are located within the lowest part of the catchment. The Ornamental Snake has been found in greatest numbers in shallow water where some aquatic vegetation is present, or where fringing groundcover vegetation has been inundated, especially in flooded gilgais where the dominant aquatic macrophyte is Bog Hyacinth (*Monochoria cyanea*);
- They have diversity of gilgai size and depth (if deep, then broad with gently sloping gradients at the sides);

- There are soils of high clay content and deep-cracking characteristics. Water retention capacity increases with an increase in the fine clay particle fraction of soils. This, in turn, influences certain habitat conditions that are important for the Ornamental Snake and the frog species it preys upon. Cracking clays with higher sand and more sodic cracking clays, often associated with Brigalow/Belah-dominated communities, have a lower fine clay particle fraction and are likely to have lesser water retention capacity;
- Ground timber is usually relatively common (especially piles adjacent to or close by to gilgais);
- Where burrowing frogs (*Cyclorana* species) are abundant; and
- Habitat patches are typically greater than 10 ha in area and are within, or connected, to larger areas of remnant vegetation.

This species is nocturnal and shelters under fallen timber, rocks, bark and deep soil cracks. Peak activity coincides with the wet season when prey species are abundant (DCCEEW, 2025).

This species was identified to occur in high-quality habitat areas during previous ecological assessments by EcoSM (2015) within HCOC. Species records and high-quality habitat occur >1 km to the west of Area 4 and is depicted in habitat mapping in **Appendix B11**. High quality habitat was ground-truthed as areas with well-developed gilgai, particularly with Brigalow overstory or where records of this species occur. This habitat type occurs outside of the Project area. No other gilgai areas have been identified within the HCOC ML during ground-truthing surveys. Additional records of Ornamental Snake occur at BWH. As this waterhole is permanent to semi-permanent depending on climatic conditions, it maintains a source of prey items (frogs) for Ornamental Snake. This area has also been mapped as high-quality habitat. MSES essential habitat for this species is mapped in areas of RE 11.3.25a, 11.3.4, 11.4.2 and 11.9.7 within the study area (NRMMRRD, 2025). The majority of essential habitat mapped within Area 3 is a buffer created from the species records within BWH. These areas were ground-truthed and recorded few habitat features for Ornamental Snake. No gilgai, cracking clay soils, semi-permanent water or extensive woody debris were present. These areas contained marginal microhabitat features for Ornamental Snake prey items which were similar to the open woodland communities encompassing the majority of the study area. These areas State mapped as essential habitat are of low quality for Ornamental Snake, no records occur in these areas, and they are unlikely to utilise these areas. MSES significant residual impact assessments are provided in **Table 17**.

All areas of high-quality habitat for this species have been avoided by design (see maps in **Appendix B**). A total of 83.5 ha of State mapped essential habitat occurs within the study area. Habitat features for Ornamental Snake (cracking clay soils, woody debris, gilgai's and wetlands) were absent to marginal in these areas and consistent with other areas of open woodland throughout the study area that were not mapped as essential habitat. Essential habitat is State mapped across RE's 11.3.4 and 11.4.2 which are not preferred vegetation communities for this species. It is unlikely that Ornamental Snake would utilise these areas and they are conservatively mapped as low quality habitat for this species. As high-quality habitat has been avoided and connectivity has been maintained, it is unlikely that the Project will significantly impact Ornamental Snake.

Table 17 Significant impact assessment for Ornamental Snake

MSES vulnerable species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of a local population	It is considered that species records and areas with gilgai are high-quality habitat for this species, which occur at BWH and in the southern portion of the ML outside of the study area. These areas are avoided by design. The habitat within the study area is State mapped as essential habitat. These areas were ground-truthed and recorded few habitat features for Ornamental Snake. No gilgai, cracking clay soils, semi-permanent water or extensive woody debris were present. These areas State mapped as essential habitat are of low quality for Ornamental Snake and they are unlikely to utilise these areas. It is unlikely that disturbance to low quality habitat within the study area would lead to a long-term decrease of the species as this species is unlikely to utilise these areas.
Reduce the extent of occurrence of the species	As HCOC does not occur near the edge of this species know distribution, there is unlikely to be a reduction in the extent of the species occurrence from the clearing of low quality habitat that occurs in Area 2 as the surrounding vegetation communities around HCOC contain similar features as this area (open eucalypt woodland with no cracking soils and minimal woody debris). Similar habitat occurs in remnant vegetation to the west, north and east of HCOC and high-quality habitat occurs outside of the study area which will retain the extent of occurrence for this species in the local area.
Fragment an existing population	The clearing of marginal habitat for Ornamental Snake within the study area is unlikely to lead to the fragmentation of any populations as high-quality habitat will be retained and connectivity along Hail Creek will be maintained.
Result in genetically distinct populations forming as a result of habitat isolation	The disturbance of low habitat is unlikely to disrupt the breeding cycle or isolate any populations as these areas are unlikely to be utilised by this species. Areas of high-quality habitat where this species is likely to breed is avoided by design. Therefore, development of the study area is unlikely to result in any genetically distinct populations forming due to habitat isolation.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	The study area is located within a modified grazing landscape where introduced plants and animals have been identified EcoSM (2015). Predation by feral pigs, dogs, foxes and cats are known threats to this species but it is unlikely that the proposed action will introduce additional invasive species or increase the abundance of such species. Pest fauna species such as foxes, dingo's and cats are currently managed at HCOC, and current practices will continue to reduce the threat to local biodiversity values from invasive pest fauna species. Therefore, invasive fauna species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the population to decline	There are no known diseases that impact Ornamental Snake, and it is unlikely that development of the study area would introduce any disease that would cause the population to decline.
Interfere with the recovery of the species	Although 83.5 ha of low quality habitat within the study area will be impacted, no Ornamental Snakes were recorded in these areas, habitat features for this species were typically absent and similar

MSES vulnerable species criteria for significant impacts	Response to criteria
	habitat features were found throughout the local area. Places where this species has previously been recorded (BWH and wetland areas adjacent to Hail Creek) are considered to be high quality habitat and occur outside of the study area. As these high quality areas are avoided, it is unlikely that disturbance to the habitat within the study area will interfere with the recovery of the species.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	All areas that contain high-value habitat and records of this species have been avoided by design. However, 83.5 ha of State mapped essential habitat for this species occurs within the study area that is considered low quality. The essential habitat mapped within Area 3 is a buffer created from the species records within BWH. All State mapped essential habitat areas were ground-truthed and recorded few habitat features for Ornamental Snake. No gilgai, cracking clay soils, semi-permanent water or extensive woody debris were present. These areas contained marginal microhabitat features for Ornamental Snake prey items which were similar to the open woodland communities encompassing the majority of the study area that are not mapped as essential habitat. These areas State mapped as essential habitat are of low quality for Ornamental Snake and they are unlikely to utilise these areas. It is unlikely that impacts to these areas would cause a disruption to an ecologically significant location for Ornamental Snake.
Conclusion	**All areas of high-quality habitat have been avoided by design. 83.5 ha of State mapped essential habitat occurs within the study area. However, as this species was not recorded in these areas during field assessments, no records of this species occurs in these areas of essential habitat, few habitat features for Ornamental Snake were recorded in these areas and similar habitat features were present throughout the study area and local area, they are considered low quality habitat for Ornamental Snake and this species is unlikely to utilise these areas. It is unlikely that impacts to low quality habitat will cause a significant impact to this species.**

3.5.4.7 Short-beaked Echidna

One NC Act special least concern species, the Short-beaked Echidna, was identified to occur within HCOC during previous ecological assessments by EcoSM (2015), and habitat for this species was ground-truthed to occur broadly across HCOC, including throughout the study area.

A broad-scale assessment of significant impacts to this species was undertaken as part of EcoSM (2015) within HCOC, which included assessment of the study area. Results from this assessment are detailed below:

"The entire study area forms habitat for this species and this habitat occurs extensively in the region. This species has no particular habitat requirements and habitat occurs extensively in the broader region. Therefore, the Project is considered unlikely to significantly impact the Short-beaked Echidna."

Overall, as the study area was considered in this previous assessment of broad-scale impact, and current assessment agrees with this outcome for the study area (**Table 18**). Habitat in the study area contains some disturbance from livestock grazing and introduced

flora species and is considered moderate quality for Short-beaked Echidna. Although there is 599.8 ha of Short-beaked Echidna habitat within the study area, this species does not have a particular habitat requirement, and vast areas of remnant vegetation occur in the broader landscape (QLD Globe, 2025). As this species occurs throughout Australia, does not have specific habitat requirements and similar habitat occurs throughout the broader area, it is unlikely that development of the study area will result in a significant impact to this species.

Table 18 MSES significant impact assessment for Short-beaked Echidna

MSES special least concern species criteria for significant impacts	Discussion of potential impacts
A long-term decrease in the size of a local population	Development of the study area will lead to a reduction of 599.8 ha of suitable habitat for this species. However, this area of suitable habitat occurs on the periphery of large tracks of similar habitat in the broader area. As this species does not have a particular habitat requirement and that vast areas of similar habitat occur in the broader landscape, it is unlikely that the development of the study area will cause a long-term decrease in the size of the local population.
A reduced extent of occurrence of the species	The study area was mapped by EcoSM (2015) as containing suitable habitat for this species. It is unlikely that the development of the study area will cause a reduction in the extent of occurrence of this species as this species does not have a particular habitat requirement, HCOC does not occur near the limits of this species range due to it occurring throughout Australia, and that vast areas of similar habitat occur in the broader landscape.
Fragmentation of an existing population	It is unlikely that disturbance of the study area will fragment any populations of Short-beaked Echidna due to large areas of remnant vegetation in the local area and connectivity being retained.
Result in genetically distinct populations forming as a result of habitat isolation	As fragmentation of this species habitat is unlikely to occur due to large areas of remnant vegetation in the local area and connectivity values being retained, development of the study area is unlikely to cause genetically distinct populations.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	The study area is unlikely to represent an ecologically significant location for this species as this species does not have a particular habitat requirement and vast amount of similar habitat occurs in the broader landscape.
Conclusion	**It is unlikely that the development of the study area will significantly impact this species.**

3.6 Matters of National Environmental Significance

3.6.1 Threatened Ecological Communities

3.6.1.1 SEVTs of the Brigalow Belt TEC

One TEC was ground-truthed within the study area. Two polygons of RE 11.9.4 occur in Area 4 and meet the key diagnostic characteristics and condition criteria for the Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar bioregions TEC



(SEVTs of the Brigalow Belt TEC; see **Appendix B6**). One additional polygon of the SEVTs of the Brigalow Belt TEC has been avoided by design through a reduction of the disturbance footprint at Area 4.

3.6.1.2 Brigalow TEC

One polygon of RE 11.9.5 that meets the key diagnostic characteristics and condition criteria for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (Brigalow TEC) has also been avoided by design through a reduction of the disturbance footprint and occurs to the east of Area 4.

3.6.1.3 Significant Impact Assessment

Under the EPBC Act MNES significant impact guidelines (DoE, 2013), an action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water draining patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species; and
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - Assisting invasive species, that are harmful to the listed ecological community, to become established; or
    - Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community, which kill or inhibit the growth of species in the ecological community.
- Interfere with the recovery of an ecological community.

Assessment for significant impacts to the SEVTs of the Brigalow Belt TEC can be found in **Table 19** and although no direct impacts to the Brigalow TEC will occur, potential indirect impacts may occur and an assessment for significant impact to the Brigalow TEC can be found in **Table 20**.

Table 19 MNES significant impact assessment for SEVTs of the Brigalow Belt TEC

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
Reduce the extent of an ecological community	Three polygons of RE 11.9.4 which equate to the SEVT of the Brigalow Belt TEC occur within Area 4. The Project has been designed to exclude one of these polygons entirely, however the remaining two polygons will be impacted to varying degrees. One polygon encompassing 1.7 ha will be

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
	impacted entirely while a portion (2.3 ha of the total 4.1 ha) of the second polygon will be impacted. Due to the small, isolated nature of these polygons and small areas of SEVT of the Brigalow Belt TEC are scattered in the broader area, it is unlikely that these polygons are important or notable in the local area. Clearing of 4.0 ha of RE 11.9.4 is unlikely to reduce the extent of this ecological community in the local area.
Fragment or increase fragmentation of an ecological community	The two polygons of RE 11.9.4 impacted by the Project are small in size and isolated in the local area. One polygon encompassing 1.7 ha will be impacted entirely while a portion (2.3 ha of the total 4.1 ha) of the second polygon will be impacted. Due to this, one polygon will be reduced in size but the separation it has to other polygons of RE 11.9.4 will not change. Impacts to these to polygons is unlikely to fragment the remaining areas of this TEC any more than what currently exists.
Adversely affect habitat critical to the survival of an ecological community	As these polygons are small in size and would hence contain a high degree of edge effect and are isolated in the local region, they are unlikely to be considered as important or notable. These small polygons have a high likelihood of being degraded by threatening processes such as grazing, weed invasion and fire which larger patches of this TEC are more resistant to. Due to this, larger, more resilient patches of this TEC would be defined as important and notable in the local environment. It is unlikely that the impact to 4.0 ha of this TEC within the study area will adversely affect habitat critical to the survival of the ecological community.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	It is unlikely that development of the study area will modify or destroy any abiotic factors that the TEC is reliant on. This vegetation community is not known as a groundwater dependent ecosystem and any change in groundwater level is unlikely to affect this TEC. It is unlikely that the development will alter any surface water drainage in areas outside of the study area that would impact upon the remaining areas of this TEC. Two small polygons will be directly impacted but indirect impacts to the retained patches are unlikely.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species.	Clearing of 4.0 ha of this TEC has the potential to cause a change in species composition of the retained areas due to invasive species colonising the area. To reduce the likelihood of this occurring, HCOC will ensure that clearing only occurs in approved areas so retained patches will not be impacted. Additionally, mitigation measures will reduce the potential of any indirect impacts occurring to retained patches including that vehicles are using existing washdown facilities and that machinery used for clearing are those that permanently exist on site. This will reduce the likelihood of invasive species colonising the retained areas and any novel invasive species being introduced to the area. With these mitigation measures in place, it is unlikely that the retained

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
	areas of this TEC will have a substantial change in the species composition to an extent that there is a decline or a loss of a functionally important species occurs.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established; or • Causing regular mobilisation of fertilisers, herbicides or other chemical or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	Clearing portions of this TEC has the potential to allow invasive species to colonise the area. HCOC will ensure that vehicles are using existing washdown facilities and that machinery used for clearing are those that permanently exist at HCOC. This will reduce the likelihood of invasive species colonising the retained areas and any novel invasive species being introduced to the area. Dust from construction has the possibility of impacting retained vegetation. To reduce any impact from on vegetation from dust accumulation, HCOC will maintain their dust suppression procedures during the clearing, construction and operational phase. With these mitigation measures in place, it is unlikely that the retained areas of this TEC will have a substantial reduction in their quality or integrity.
Interfere with the recovery of an ecological community	Although the design impacts upon this TEC (totalling 4.0 ha), these isolated polygons are unlikely to contribute to the specified objectives for the recovery of this TEC including: • Identify and evaluate the extent, biodiversity value and condition of remnant and regrowth areas of SEVTs of the Brigalow Belt TEC in the brigalow Belt (North and South) and Nandewar Bioregions; • Establish a comprehensive, adequate and representative system of SEVTs of the Brigalow Belt TEC areas across the Brigalow Belt (North and South) and Nandewar Bioregions, protected either by reservation or conservation agreements; • Ensure 'best-practice' management is applied to sites containing the SEVTs of the Brigalow Belt TEC; and • Encourage involvement of landholders and the community in the conservation and management of the SEVTs of the Brigalow Belt TEC (DERM, 2010). Impacts to the two polygons of this TEC is unlikely to interfere with the recovery of the ecological community.
Conclusion	**The Project footprint has been designed to avoid areas of RE 11.9.4 where possible. Two small polygons will be unavoidable. However, these two polygons are small in size and hence contain a high degree of edge effect and are isolated in the local region. These small polygons are unlikely to be considered important or notable for this TEC. It is unlikely that impacts to these two polygons (4.0 ha) will cause a significant impact to SEVT of the Brigalow Belt TEC.**

Table 20 MNES significant impact assessment for Brigalow TEC

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
Reduce the extent of an ecological community	This TEC has been avoided by design. With mitigation measures in **Section 3.4** in place to ensure indirect impacts such as weeds and dust will be unlikely then development of the study area will not reduce the extent of this TEC.
Fragment or increase fragmentation of an ecological community	This TEC has been avoided by design. It is unlikely that development within the study area will fragment this TEC.
Adversely affect habitat critical to the survival of an ecological community	This TEC has been avoided by design. It is unlikely that development within the study area will adversely affect any habitat critical to the survival of this TEC.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	It is unlikely that development of the study area will modify or destroy any abiotic factors that the TEC is reliant on. This vegetation community is not known as a groundwater dependent ecosystem and any change in groundwater level is unlikely to affect this TEC (SLR, 2025). With mitigation measures in **Section 3.4** in place, it is unlikely that the development will alter any surface water drainage in areas outside of the study area.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species.	This TEC has been avoided by design and development within the study area is unlikely to alter the species composition of this TEC.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established; or • Causin regular mobilisation of fertilisers, herbicides or other chemical or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	This TEC has been avoided by design. Clearing near this TEC has the potential to allow invasive species to colonise the area. HCOC will ensure that vehicles are using existing washdown facilities and that machinery used for clearing are those that permanently exist at HCOC. This will reduce the likelihood of invasive species colonising the retained areas and any novel invasive species being introduced to the area. Dust from construction has the possibility of indirectly impacting this TEC. To reduce any impact on vegetation from dust accumulation, HCOC will maintain their dust suppression procedures during the clearing, construction and operational phase. With these mitigation measures and those in **Section 3.4** in place, it is unlikely that the retained areas of this TEC will have a substantial reduction in their quality or integrity.
Interfere with the recovery of an ecological community	This TEC has been avoided by design and with mitigation measure in **Section 3.4** in place it's unlikely that development of the study area would indirectly interfere with the recovery of this TEC.
Conclusion	**Overall, this TEC has been avoided by design, and it is unlikely that a significant impact will occur to this TEC.**

3.6.2 Conservation Significant Species

The below assessments include the assessment of significant impacts to flora and fauna species at the Commonwealth level, where relevant. The *Matters of National Environmental Significance Significant impact guidelines 1.1* (DoE, 2013) was used and is detailed below.

MNES Vulnerable Species

Under the EPBC Act, significant impacts to vulnerable species relate only to important populations. An important population as defined by EPBC is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range (DoE, 2013).

If an important population of a vulnerable species is determined to occur within the proposed disturbance area, then an action is likely to have a significant impact on the species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of 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;
- Result in invasive species that are harmful to the vulnerable species becoming established in the vulnerable species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere substantially with the recovery of the species.

MNES Endangered species

For critically endangered and endangered species, an action is likely to have a significant impact if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;

- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

3.6.2.1 Black Ironbox

Black Ironbox is listed as vulnerable under the EPBC Act. An assessment by SLR in 2023 recorded Black Ironbox in an additional tributary within the study area to those mapped as habitat for this species by EcoSM (2015). This tributary where it intersected with the study area was traversed on foot and areas where Black Ironbox occurred was mapped with a handheld GPS device. This small area (approximately 300 m in length) is State mapped as non-remnant with ground-truthed surveys by EcoSM (2015) and SLR (2022) confirming this. Riparian vegetation was sparse and restricted immediately to the bed and top of bank of the small ephemeral watercourse. Small, scattered Black Ironbox were recorded with an average of 7.5 trees per 100 m transect. This additional area is shown in maps in **Appendix B7**.

This species can grow up to 30 m tall with rough longitudinally fissured bark that can reach the base of the larger branches with most upper branches smooth (DEWHA, 2008). Black Ironbox grows mainly on watercourses but can occasionally occur on river flats on moderately fertile and moist soils. This species occurs in central coastal and sub-coastal Queensland from Charters Towers and Ayr, south to Rockhampton. Two main subpopulations occur, one from Nebo north to Ayr and one from Apis Creek to Rockhampton (DEWHA, 2008). The main threats to this species are:

- Habitat loss and disturbance;
- Smothering from Rubber Vine (*Cryptostegia grandiflora*) and Chinee Apple (*Ziziphus mauritiana*);
- Timber harvesting;
- Increased fire frequency associated with increased fuel loads from weed and non-native grass species; and
- Land management that increases stream bank erosion.

A significant impact assessment for Black Ironbox can be found in **Table 21**. Overall, Hail Creek occurs at the southern and western limit of one of the main subpopulations of Black Ironbox and this subpopulation is considered an important population for this species (EcoSM, 2015). The current design has avoided Black Ironbox habitat in multiple areas, however, impacts to this species will occur in one portion of the study area. A small portion of Black Ironbox habitat (2.0 ha) could not be avoided by design in Area 2 whilst retaining the target resource. It is unlikely that the small amount of impact to Black Ironbox will significantly impact this species.

Table 21 MNES significant impact assessment for Black Ironbox

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of an important population of a species	Black Ironbox at Hail Creek is considered to occur within an important population as Hail Creek is located near the extent of occupancy for this species. The study area intersects with Black Ironbox habitat in one area, Area 2 (0.5 ha remnant and a non-remnant patch incorporating 1.5 ha upstream of this). BioCondition assessments recorded an average of 7.5 *E. raveretiana* per 100 m in upper tributaries of Hail Creek.

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
	This portion of Area 2 is approximately 400 m in length which equates to approximately 30 *E. raveretiana* being impacted. The 2.0 ha of impact to Black Ironbox within Area 2 has been greatly reduced from previous designs. It is unlikely that this small area of any important value as its located in the upper reaches of a small tributary and all downstream habitat will not be impacted. It is unlikely that the small amount of disturbance to this species habitat within the study area would lead to a long-term decrease in the size of the population as its located on the top of the catchment.
Reduce the area of occupancy of an important population	Black Ironbox at Hail Creek is considered to occur within an important population as Hail Creek is located near the extent of occupancy for this species. The study area intersects with Black Ironbox habitat in one area, Area 2 (2.0 ha). The small amount of impact to Black Ironbox within Area 2 has been greatly reduced from previous designs. Black Ironbox occurs throughout Hail Creek and impacts to 2.0 ha in the upper portions of a tributary of Hail Creek is unlikely to reduce the area of occupancy of an important population as the downstream environment where the majority of Black Ironbox occurs will not be impacted.
Fragment an existing important population into two or more populations	It is unlikely that the small amount of impact to Black Ironbox habitat (2.0 ha) will fragment any important populations as it is located on the upper section of a small tributary with no other areas of Black Ironbox habitat upstream. Seed dispersal will not be impeded from flowing to any downstream environment and no fragmentation will occur.
Adversely affect habitat critical to the survival of a species	A small amount of clearing of Black Ironbox habitat (2.0 ha) will occur, however, this area is not considered habitat critical to the survival of the species due to its location in the upper reaches of a small tributary. No Black Ironbox habitat occurs upstream of this area and the downstream habitat will not be impacted. Black Ironbox were recorded throughout the upstream environment of other tributaries of Hail Creek within the ML and in high densities downstream within the existing offset area. The small amount of clearing will not affect habitat critical to the survival of this species.
Disrupt the breeding cycle of an important population	It is unlikely that impacts to 2.0 ha of habitat will disrupt the breeding cycle of an important population as Black Ironbox is present upstream and downstream of the impact areas with genetic material not being impeded to the populations downstream.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Black Ironbox were recorded throughout the upstream environment of Hail Creek within the ML and in high densities downstream within the existing offset area. As Black Ironbox occurs throughout Hail Creek, some individuals will be impacted, however, it is unlikely that the small amount of clearing (2.0 ha) will impact upon this species to the degree that the species is likely to decline in the local area.

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The main invasive species that can lead to the decline of Black Ironbox include Rubber Vine (*Cryptostegia grandiflora*), Guinea Grass (*Megathyrsus maximus*) and Lantana (*Lantana camara*) with Lantana and Guinea Grass recorded at HCOC in low densities. It is unlikely that development of the study area would introduce detrimental invasive species that are not already present in the local environment or increase the density of invasive species in the local area with those mitigation measures in **Section 3.4** in place. Additionally, sufficient facilities and equipment is provided at HCOC for the washdown of machinery and vehicles. This will reduce the likelihood of invasive species colonising the retained areas and any novel invasive species being introduced to the area.
Introduce disease that may cause the species to decline	Phytophthora root fungus is a fungal disease that is known to impact on the health of eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in eucalypts; therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. Sufficient facilities and equipment are provided at HCOC for the washdown of machinery and vehicles currently. Using these facilities during vegetation clearing and construction will reduce the likelihood of spreading any potential existing pathogens and any novel pathogens being introduced to the area. Additionally, the weed monitoring program will be maintained.
Interfere with the recovery of the species	There is no approved recovery plan for this species. As the small amount of clearing will not inhibit the transfer of genetic material to the downstream environment, and weed management will continue to be implemented, it is likely that succession will continue in the downstream environment and activities will not interfere with the recovery of Black Ironbox.
Conclusion	**The population of Black Ironbox at HCOC is considered an important population and current designs have avoided the majority of impact to this species. One area, within Area 2, was unable to be avoided with a total of 2.0 ha being impacted (0.5 ha of remnant vegetation and 1.5 ha of non-remnant vegetation). The small area within Area 2 impacts upstream portion of a large polygon of habitat for this species that will be retained. As connectivity is to be maintained with genetic material not being impeded downstream and those mitigation measures in Section 3.4 implemented, it is unlikely that the small amount of impact would lead to a significant impact to this species.**

3.6.2.2 White-throated Needletail

The White-throated Needletail is listed as vulnerable and migratory under the EPBC Act. An individual of this species was observed flying once over the rock bar that crosses Hail Creek in the central portion of HCOC during assessments by EcoSM (2015). Another individual was recorded in November 2023 during monitoring of the existing Black Ironbox Offset area by SLR. However, as this species was not listed as vulnerable during the development of EcoSM (2015) report, an assessment of potential significant impacts to this species was not previously undertaken.

This trans-equatorial insectivorous species is a seasonal non-breeding visitor to Australia that inhabits aerial habitats from a height of <1 m to >1000 m above the ground. As this is an aerial species, it is considered that conventional habitat descriptions are inapplicable. However, it is notable that this species commonly occurs over a variety of wooded to open habitat types. Foraging habitat for this species includes the aerial layers that it preferentially inhabits. Additionally, this species has been documented to roost in forest and woodland trees within Australia only on rare occasions (TSSC, 2019). Threats to this species within Australia include collision with wind turbines, overhead wires, windows, and lighthouses. However, the scale of these threats and their potential to impact this species at a population level requires further investigation. The use of insecticides, particularly organochlorines, has been suggested as a potentially contributing to a decline in this species in addition to vegetation clearing. These factors result in predominantly indirect impacts to this species through secondary poisoning after ingesting treated insects and a reduction of invertebrate prey. Vegetation clearing may also reduce the availability of roosting sites and therefore also contribute to the declines in this species. However, it is thought that the greatest risk to this species is logging of breeding habitat and hunting in Siberia, outside of Australia (TSSC, 2019; Tarburton, 2021).

Based on the available information, it is considered that there are no important populations, as defined within TSSC (2019) and Tarburton (2021) of this species within Australia. This is suggested as this species does not breed within Australia, occurs trans-equatorially, and forages over a wide variety of habitats that are broadly represented within Australia. An assessment of significant impact under MNES criteria is detailed in **Table 22**. Overall, it is considered that there will be no significant residual impact to this species as a result of development of the study area.

Table 22 Significant impact assessment for White-throated Needletail

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of an important population of a species	There are no important populations of this species in Australia. A single individual was recorded outside the study area by EcoSM in 2015. As a single individual was recorded and that this species is almost entirely aerial in Australia, it's unlikely that development of the study area would lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	There are no important populations of this species in Australia and its unlikely that the development of the study area would reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	It is unlikely that disturbance in the study area will fragment the population of this species within Australia. This is suggested as development of the study area is

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
	not likely to constitute a barrier to the dispersal of this aerial species.
Adversely affect habitat critical to the survival of a species	The greatest threat to this species is the reduction in breeding habitat and this may constitute habitat critical to the species. As this species is almost entirely aerial and non-breeding when in Australia, it is unlikely that development of the study area would impact habitat critical to the survival of this species.
Disrupt the breeding cycle of an important population	This species does not breed while in Australia and its unlikely that development of the study area would disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The only ecologically significant location that the study area is likely to provide for this species is foraging habitat. However, as this species forages in the area above the study area, it is unlikely that development of the area will cause any significant disruption to the foraging habitat to where this species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No invasive species within Australia are identified to be harmful to this species as a whole due to the aerial habitats that this species predominantly occur within. Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Introduce disease that may cause the species to decline	No disease is identified as potentially impacting this species within Australia. Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Interfere with the recovery of the species	The main recovery objective is to protect breeding areas in east Asia and as this species does not breed in Australia, it is unlikely that development of the study area would interfere with the recovery of the species.
Conclusion	**The Project is unlikely to result in a significant impact to this species.**

3.6.2.3 Squatter Pigeon (Southern)

This species is listed as vulnerable under the EPBC Act. The species occurs in Queensland and northern New South Wales. In the north it hybridises with the northern subspecies (*Geophaps scripta peninsulae*) from the Burdekin-Lynd divide in southern Cape York Peninsula to the Charters Towers and Townsville area; it occurs near-coastally from Townsville to Lake Wivenhoe west of Brisbane and inland to Charleville, Barcaldine and Hughenden. Suitable habitats for the species are open-forests to sparse open-woodlands and scrub with the following characters (DCCEEW, 2025c; Lloyd *et al*., 2025):

- Predominance of trees or shrubs of the genera *Eucalyptus, Corymbia, Acacia* and *Callitris*. *Eucalyptus* and *Corymbia* species are more utilised and preferred compared to *Acacia* and *Callitris* (Lloyd *et al*., 2025);
- Within remnant and high-value regrowth vegetation, the groundcover and average ground vegetation cover ranges between 24 - 73 %;

- Suitable habitats within 1.7 km of a perennial water source are important for foraging and those within 1 km of a perennial water source are important for nesting (Lloyd *et al.*, 2025; TSSC, 2025). This includes large watercourses (stream order 4 and above), wetlands, livestock dams or livestock watering troughs;
- In the Brigalow Belt Bioregion, alluvial areas (landzone 3) contain preferred habitat;
- In suitable habitat, the landscape slope is gentle and is typically less than 3.3 (Lloyd *et al*., 2025); and
- *Eucalyptus* woodland and open woodlands with a grassy ground layer is required.

The species is ground-dwelling and has specific habitat requirements relating to vegetative structure and composition. Sparse, patchy ground cover, allowing freedom of movement while foraging on the ground, is preferred. This tends to consist of native perennial tussock grasses to approximately 33 % cover, with or without low shrubs and native forbs (the seeds of some non-native forbs, such as *Stylosanthes* spp., are also eaten) and interspersed with bare, dusty ground, leaf litter and CWD. These habitats appear to provide the balance of openness to facilitate foraging, complexity to provide cover, and vantage points from which to view potential threats. New research by Lloyd *et al*. (2025) suggests that patchy groundcover can range between 24 - 73 % in suitable habitat.

Suitable habitats can be identified with some confidence by soil type. The preferred open forest to open woodland with a grassy ground layer habitat generally occur on well-draining gravelly, sandy or loamy soils. In Queensland, suitable habitats are generally limited to landzones 5 and 7 — sandy to loamy soils on low to gently rising or undulating plains and low lateritic escarpments. This species often occurs in burnt areas and, like many granivorous birds, is often encountered on tracks and roadsides (TSSC, 2025). Current studies have shown that landzone preference in the Brigalow Belt Bioregion is strongly correlated with landzone 3 (alluvial soils; Lloyd *et al*., 2025) but can also occur in a range of other landzones. As this species requires daily water, landzone 3 typically contains water sources in the environment. Suitable habitat within 1.7 km of a perennial source (large watercourse, wetland, cattle dams and troughs) is preferred and nesting habitat has been shown to occur closer to these water sources (<1 km). Slope has also been shown to be important with flat to gentle slopes of less than 3.3°preferred (Lloyd *et al*., 2025).

The Squatter pigeon (southern) is very rare in the south of its range (southern Queensland and New South Wales) and is affected by multiple pressures further north. Habitat clearing and fragmentation, including for agriculture, and grazing pressures, especially cattle grazing in the north and sheep grazing in the south, are the primary drivers of the subspecies' decline to date. These are ongoing pressures, though cattle grazing is considered less impactful than sheep grazing as some pasture improvement species are eaten by Squatter Pigeons and cattle grazing does not always involve vegetation clearing. Other current threats include grazing by feral mammals, predation by feral predators, transformation of habitats by weeds, fire regime change, and illegal shooting (TSSC, 2025).

This species was recorded within HCOC at several locations during previous ecological assessments by EcoSM (2015). Additionally, ground-truthing activities by EcoSM (2015) identify that all remnant vegetation, with the exception of RE 11.9.4 and RE 11.9.5, within the study area comprises potentially high-value habitat for this species. High-quality habitat was mapped in areas with suitable groundcover species used for foraging (EcoSM, 2015), distance to water sources and where the species was recorded during field assessments. RE 11.9.4 and RE 11.9.5 were considered to comprise low quality habitat due to these communities being considered too dense or waterlogged and less likely to be used by this species aside from movement between more suitable habitats ((EcoSM, 2015), State-

mapped essential habitat occurs within the study area for Squatter Pigeon (Southern) with all confirmed by field assessments.

All relatively small, isolated and sparsely distributed sub-populations occurring south of Carnarvon Ranges in Central Queensland are considered to be important sub-populations of this species (TSSC, 2015; DETSI, 2025). These include, but are not limited to those that:

- Occur in the Condamine River catchment and Darling Downs of southern Queensland;
- Are known to occur in the Warwick-Inglewood-Texas region of southern Queensland; and
- Any populations potentially occurring in northern New South Wales.

As HCOC occurs well north of the Carnarvon Ranges and does not occur within any of these areas identified to comprise important populations of this species, it is considered that there are no important populations of this species within the study area. This conclusion is consistent with that provided within EcoSM (2015) for the Hail Creek Transition Project. Habitat critical to the survival of the species is not defined in DCCEEW (2025) and is identified on a site-specific basis. At HCOC, areas around water points where this species has been recorded are likely to be more preferred habitat and can be a surrogate for habitat critical to the survival of this species. These areas are BWH and a cattle dam north or Area 2 that is outside the HCOC ML. Both of these areas have been avoided. All of the study area contain similar habitat attributes for this species but no areas of permanent or semi-permanent water occur. No Squatter Pigeon (southern) have been recorded in the study area with records occurring mainly on the northern HCOC ML boundary. An assessment of significant impact under MNES criteria is provided in **Table 23**.

Overall, development of the study area will impact upon 595.8 ha of habitat that is used for breeding, foraging, nesting and resting which will adversely affect habitat critical to the survival of a species. Avoidance options have been considered, however as the majority of the study area was ground-truthed as habitat for this species, avoidance measures were unable to be implemented to entirely avoid habitat for this species whilst still retaining the target resource. A significant impact will occur to this species, and the provision of an environmental offset will likely be required.

Table 23 Significant impact assessment for Squatter Pigeon (Southern)

MNES vulnerable species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of an important population of a species	The study area is not considered to contain an important population for this species (Condamine River catchment, Darling Downs, Warwick-Inglewood-Texas region or in NSW) and the Squatter Pigeon (Southern) is common in the northern portions of its range (TSSC, 2015). Additionally, as broad areas of similar habitat occur outside of the ML, it is unlikely that the development within the study area will lead to a long-term decrease in the size of the local population.
Reduce the area of occupancy of an important population	The study area is not considered to contain an important population for this species, and the Squatter Pigeon (Southern) is common in the northern portions of its range (TSSC, 2015). Additionally, development within the study area is unlikely to reduce the area of occupancy of this species as it has been recorded in various habitats

MNES vulnerable species criteria for significant impacts	Response to criteria
	surrounding the HCOC ML, including HNPand HCOC is not located near the edges of this species known range.
Fragment an existing important population into two or more populations	The study area is not considered to contain an important population for this species, and the Squatter Pigeon (Southern) is common in the northern portions of its range (TSSC, 2015). It is unlikely that development within the study area will fragment an existing important population as the study area is an extension of approved and/or existing disturbance and large areas of remnant vegetation that would be considered habitat for this species border the HCOC ML to the west, east and north.
Adversely affect habitat critical to the survival of a species	The study area contains habitat that is used for breeding, foraging, nesting and resting for Squatter Pigeon (Southern). Areas near permanent and semi-permanent water area likely higher quality habitat for this species at HCOC and can be classified as habitat critical to the survival of the species. These areas, BWH and a cattle dam north of Area 2, occur outside of the study area and are avoided by design. No areas of permanent or semi-permanent water occur in the study area. The habitat for this species is fairly homogenous throughout the study area and although 595.8 ha will be removed, no Squatter Pigeon (southern) have been recorded in this area and its unlikely to be classified as habitat critical to the survival of the species around HCOC.
Disrupt the breeding cycle of an important population	The study area is not considered to contain an important population for this species, and the Squatter Pigeon (Southern) is common in the northern portions of its range (TSSC, 2015). Development of the study area will not disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The study area contains 595.8 ha of habitat for this species, and multiple records of this species occur in the local area. It is likely that habitat in the study area is used for breeding, foraging, nesting and resting and the removal of this amount of habitat is likely to lead to a decline in the local population.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	It is unlikely that development of the study area would introduce detrimental invasive species that are not already present in the local environment or increase the density of invasive species in the local area, HCOC will continue to implement their weed monitoring program to reduce potential impacts. Additionally, HCOC monitors for invasive pest species (cat, fox, dingo) and implements control measures if any are recorded. This would further reduce the likelihood of the Project introducing or increasing the population of invasive species in the local area.
Introduce disease that may cause the species to decline	There are no known diseases that impact upon this species, and it is unlikely that the development of the study area would introduce any diseases that would reduce the local population.
Interfere with the recovery of the species	The main threats to this species include habitat loss, trampling, browsing or grazing of habitat and predation and competition. The development of the study area is unlikely to

MNES vulnerable species criteria for significant impacts	Response to criteria
	increase threats of trampling, browsing or grazing of habitat or predation and competition for this species. Habitat loss does interfere with the recovery of the species however, this is mainly focused on areas containing important populations of this species (TSSC, 2015). HCOC is located well north of the Carnarvon Ranges which is the most norther distribution for important populations. Squatter Pigeon (Southern) are common in the northern portions of their range and its unlikely that development of the study area will interfere with the recovery of the species.
Conclusion	**Development within the study area will impact upon 595.8 ha of habitat that is used for breeding, foraging, nesting and resting. The removal of this amount of habitat is likely to cause a decline in the local population. A significant residual impact to this species and the provision of an environmental offset will likely be required.**

3.6.2.4 Koala

Koala is listed as endangered under the EPBC Act. This is a nocturnal, tree-dwelling, obligate folivore (leaf eater) with a highly specialised diet. The diet of this species is defined by the availability and palatability of a limited variety of *Eucalyptus*, *Corymbia* and *Angophora* species. Across Australia, this species has a wide distribution across the eastern and southern States. Within Queensland, this species occurs in patchy and often low-density, widespread and fragmented populations. It is estimated that approximately 79,264 individuals of this species occur across Queensland, approximately 11,071 of these within the Brigalow Belt (south) Bioregion at a density of approximately 0.0005 Koalas/ha across Queensland. Home ranges of individuals of this species are highly variable (3 to 500ha) and is dependent on life history stage, soil fertility, habitat and quality and nutritional requirements. Individuals of this species spend significant periods of time moving across the ground between food and shelter trees (>400 different tree species). Preferred tree species differ depending on habitat type and location across their range. The above information was obtained from DCCEEW (2025).

Koala reproduction is heavily influenced by seasonality, and the breeding season differs between northern and southern populations. This species is a marsupial, bearing pouch-young (joeys) (DCCEEW, 2025).

Habitat critical to the survival of this species is described in DCCEEW (2025) as the areas that the species relies on to avoid or halt decline and promote the recovery of the species. Under the EPBC Act, the following factors and any other relevant factors may be considered when identifying habitat that is critical to the survival of the species:

- Whether the habitat is used during periods of stress (e.g., flood, drought or fire);
- Whether the habitat is used to meet essential life cycle requirements e.g., foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes);
- The extent to which the habitat is used by important populations;
- Whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development;

- Whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements;
- Whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation; or
- Any other way in which habitat may be critical to the survival of a listed threatened species or a listed TEC.

Recent studies (Dique *et al.*, 2003; Melzer *et al.*, 2014; Rhodes *et al.*, 2015; Cristescu *et al.*, 2019; Menkhorst *et al.*, 2019; Youngentob; Marsh & Skewes, 2021) have characterised important Koala habitat as:

- An area with high diversity and abundance of suitable food trees (including locally unique food trees);
- A ground layer that allows individuals to move freely between trees;
- Proximity to watercourse or drainage channel;
- Undisturbed primary forests (including little to no past logging); and
- Presence of Koala signs.

DCCEEW (2025) describes climate sensitive populations of this species, which equate to important populations of this species. This is because Koalas at the western edge of their range are being impacted by shifts in rainfall patterns and increasing frequency of drought and heat stress resulting directly from climate change. The western edge populations are characterised by low population density and a high level of isolation from other populations. Therefore, they are increasingly vulnerable to environmental change and habitat loss. The western-edge populations were identified as potentially containing adaptive genes to environmental stressors indicating they have high conservation value.

Numerous severe threats impacting this species are described in DCCEEW (2025). These are:

- Loss of climatically suitable habitat, increased intensity/frequency of drought, Increased intensity/frequency of heatwaves, increased intensity/frequency of bushfire, declining nutritional value of foliage, clearing and degradation of Koala habitat, Encounter mortality of vehicles and dogs, KoRV and *Chlamydia* (*Chlamydia percorum*).

This species was identified to occur at eight locations within HCOC during previous ecological assessments by EcoSM (2015). Some of these previous observations occurred within the current study area. Assessments undertaken in EcoSM (2015) identify the population of Koala within the study area to be an important population and that all habitat within HCOC is considered critical habitat for the Koala under the EPBC Act referral guidelines.

The majority of the current study area is mapped as habitat for Koala (EcoSM, 2015). Due to the amount of records in and around the study area and the vegetation communities present, all remnant vegetation is considered high quality habitat for this species. The exception is RE 11.9.4 which due to its floristic structure, density and diversity is unlikely to be utilised by Koala. Within the study area, riparian areas are considered the highest quality habitat for this species due to the density of the vegetation, the floristic structure and diversity present and

the increased leaf moisture due to semi-permanent water being available. RE 11.3.25/a contained an important tree species for Koala, *Eucalyptus tereticornis*, and ancillary habitat tree species such as *Corymbia tessellaris*, *Acacia salicina* and *Melaleuca bracteata* (Youngentob, Marsh and Skewes, 2021). Other areas of Koala habitat within the study area, although still considered critical habitat for this species are of lower quality compared to riparian areas as they occur in open woodlands with reduced connectivity between canopies, are further away from semi-permanent water, which results in lower leaf moisture, and are modified areas for livestock grazing. Although the open woodlands are lower quality compared to riparian areas, the majority of previous observations of Koala occurred in these open woodland communities indicating this habitat type is highly used by this species. These areas recorded some important Koala trees such as *Eucalyptus crebra, E. orgadophila, E. populnea* and E*. tereticornis* and ancillary species such as *Corymbia dallachiana, C. tessellaris and Acacia salicina* (Youngentob, Marsh and Skewes, 2021).

Additional surveys for Koala were conducted in the study area and in the immediate surrounds of HCOC by SLR between 2022 and 2023. These included additional ecological assessments in the study area in November 2022 and March 2023. In the HCOC ML (ML4738), fauna monitoring was conducted in both of the existing offset areas in November 2023 and baseline assessments were also conducted in the proposed offset area (Lot 13 on plan WHS466) adjacent to HCOC in November 2023. The outcomes of these additional surveys confirmed that Koala utilise various eucalypt dominated communities in and immediately surrounding HCOC. Multiple Koala were recorded during these assessments, mainly in RE's 11.3.4, 11.3.25, 11.3.25a, 11.3.27, 11.9.9, 11.11.15. The same RE's or those with a similar floral composition and structure ground-truthed in the study area include RE's 11.3.4, 11.3.25/a, 11.4.2, 11.9.2, 11.9.7 and 11.9.9 which are considered high quality habitat for this species at HCOC. It is likely that Koala in the Hail Creek area utilise the vegetation communities on alluvial soils (vegetation communities on land zone 3) during drier periods where leaf moisture is higher and disperse from these areas into the surrounding landscape (vegetation communities on landzones 4, 9 and 11) during more preferrable climate conditions.

A SBC occurs on the northern part of the ML running east to west. This SBC connects HNP with other areas of remnant vegetation further to the west. It should be noted that the various portions of the study area do not directly connect to HNP and only the SBC and its associated buffers connects these areas. Lot 13 on plan WHS466 (the proposed offset area) incorporates large portions of the SBC and lies between Areas 1, 2 and 3 and HNP. The majority of the SBC around HCOC consists of strongly undulating terrain following a ridge line that originates in HNP to the east and traverses to the north and west of HCOC. Parts of the buffer zone of this SBC occurs in the norther portion of the HCOC ML in previously approved and active mining areas. The buffer zone of this SBC includes all of Area's 1, 2 and 3. During the numerous previous surveys, Koala were recorded in the SBC buffer zone. The majority of these records are associated with riparian vegetation. Riparian areas in the northern part of the ML are small tributaries of Hail Creek and maintain connectivity between important environmental features, namely Hail Creek, BWH and the SBC. Although the majority of Koalas were recorded in riparian areas, some Koalas were recorded in more open and arid eucalypt woodlands associated with landzones 9 and 11. It is likely that riparian vegetation acts as a refuge and is utilised throughout the year. During more favourable conditions, Koala disperse to more arid vegetation communities dominated by *Eucalyptus* species.

Currently, the buffer zone of the SBC, where it occurs in the HCOC ML, consists mainly of active mining and previously approved mining areas. Areas 1, 2 and 3 form a small part of existing mining activities within the northern portion of the ML. Connectivity north to south along Hail Creek for Koala is already restricted due to existing haul roads bisecting Hail

Creek in multiple places. These existing barriers to connectivity through Hail Creek are currently isolating Koala habitat that occurs in the central portion of Hail Creek within the ML. The study area is an extension of the previously approved mining areas, but it is unlikely that it will impact connectivity for Koala more than what is already present. Connectivity in the northern portion of Hail Creek, BWH and the SBC will be maintained. Development of Areas 1, 2 and 3 will remove high quality Koala habitat that is used for feeding and dispersal through the local area likely during favourable environmental conditions, however, watercourses and riparian vegetation will be avoided that will allow for connectivity through the local landscape. In particular, BWH and its associated watercourse are avoided by the current design which maintains connectivity for Koala between the adjacent proposed offset area, BWH and the Hail Creek. The existing restricted connectivity north and south along Hail Creek and patches of isolated Koala habitat between existing haul roads will not change with development of the study area. These existing connectivity issues are temporary and rehabilitation of the haul roads where they bisect Hail Creek will occur after the life of mine to re-establish connectivity from north to south through the HCOC ML.

Due to previously approved mining areas and extensive clearing for livestock grazing, connectivity of Area 4 is currently restricted. Area 4 is an extension of a previously approved mining area and the property abounding to the east has been extensively cleared for livestock grazing. These prior disturbances have already effectively cut off the southern portion of the ML, including Area 4, with HNP. Some connectivity values currently exist between Area 4 and Hail Creek, however, existing haul roads that occur upstream reduce connectivity for Koala north and south on Hail Creek. Development of Area 4 will remove high quality habitat that is used for feeding and likely for dispersal during favourable conditions. Although habitat for Koala will be removed, the connectivity values around Area 4 will be unchanged. Similar habitat will be retained to the west of Area 4 where is joins to Hail Creek. Riparian corridors along Hail Creek to the west and south are unimpeded by HCOC while existing haul roads likely reduce connectivity values north towards Areas 1, 2 and 3. Development of Area 4 will not change connectivity values for Koala. These existing connectivity issues are temporary and rehabilitation of the haul roads where they bisect Hail Creek will occur after the life of mine to re-establish connectivity from north to south through the HCOC ML.

As this species was previously determined to be potentially significantly impacted by development of the Hail Creek Transition Project, an additional assessment is provided below specific to development of the study area (**Table 24**). Results from this specific assessment are similar to those provided within EcoSM (2015) for the broader Hail Creek Transition Project area, indicating that impacts to Koala habitat, which occurs throughout the majority of the study area, are difficult to avoid. The clearing of 595.8 ha of Koala habitat will cause a significant residual impact to this species as it will adversely affect habitat critical to the survival of this species. Although the final landform will impact Koala habitat, the majority is considered dispersal habitat during optimal environmental conditions and riparian areas that provide connectivity between important areas will be maintained. Avoidance options have been considered, however as the majority of the study area was ground-truthed as habitat for this species, avoidance measures were unable to be implemented to entirely avoid habitat for this species whilst still retaining the target resource. Mitigation measures for Koala can be found in **Section 3.4** which include establishing no go zones when Koala are encountered prior to vegetation clearing commencing. The provision of an environmental offset will likely be required. To help protect the majority of the SBC around HCOC, the proposed offset area for this project has been nominated on Lot 13 on plan WHS466 that borders the northern portion of HCOC. This area is a key link of the SBC and connects HNP to vast tracks of remnant vegetation to the west and to the northern tributaries of Hail Creek. This area also recorded numerous Koala during baseline assessments in various eucalypt

dominated communities. Securing this area as an offset will protect connectivity in the local and broader area.

Table 24 Significant impact criteria for Koala

MNES endangered species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of a population	The sub-population of Koalas in the study area are potentially part of an important population. The proposed action will impact Koala habitat; however, extensive areas of similar vegetation communities occur in the local region that likely contain similar habitat qualities to those found in the project area. HNP contains approximately 115,800 ha of remnant and connected vegetation communities with numerous Koala records (ALA, 2025) and is located adjacent to the project area. Impacts to Koala habitat at HCOC constitutes approximately 0.5 % of remnant vegetation communities associated with HNP alone and additional remnant vegetation communities occur immediately to the north and west of HCOC. There is potential for a small, short-term decrease in the local population, yet it is considered unlikely a long-term decrease will occur due to the extensive areas of connected habitat that occur in the broader landscape.
Reduce the area of occupancy of the species	The proposed action will impact 595.8 ha of Koala habitat, however, it is unlikely that it will reduce the area of occupancy of Koala as HCOC is not located near an edge of this species' known distribution. The majority of Koala records in the local area occur throughout the Great Dividing Range to the east of HCOC associated with vast areas of remnant vegetation. As large areas of remnant vegetation will be retained in the local area maintaining connectivity, it is unlikely that removal of habitat with the HCOC ML will reduce the extent of occurrence of the species in the local area.
Fragment an existing population into two or more populations	The disturbance to Koala habitat is unlikely to fragment a population as individuals will be able to move throughout the wider landscape. In the local area, remnant vegetation associated with the Great Dividing Range to the east of HCOC contains numerous records of Koala with the range likely acting as a corridor. These vast tracts of remnant vegetation occur to the east, north and west of HCOC. As the vast areas of remnant vegetation outside of the ML are avoided, it's unlikely that the local population will be fragmented by the Project.
Adversely affect habitat critical to the survival of a species	Previous Koala observations occurred within HCOC, including in the current study area, in both riparian and open woodland communities EcoSM (2015) indicating both of these main habitat types are utilised by Koala. The habitat within the study area is likely classified as habitat critical for the survival of the species. Due to the abundance of Koala observed in and around HCOC, including the study area, and vegetation communities within the study area containing preferred habitat requirements for Koala, it is considered that habitat within the study area is critical to the survival of this species. The clearing of 595.8 ha of Koala habitat will adversely affect habitat critical to the survival of this species.

MNES endangered species criteria for significant impacts	Response to criteria
Disrupt the breeding cycle of a population	The disturbance of Koala habitat is unlikely to disrupt the breeding population as individuals will be able to move throughout the wider landscape. To further reduce any potential impact to the breeding cycle of Koala, mitigation measures to reduce unnecessary light and noise will be implemented during the construction and operational phases of the Project.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will impact 595.8 ha of Koala habitat. There is potential that the reduction of habitat will result in increased pressure upon remaining habitat and lead to a short-term decrease in population. However, large areas of similar habitat are present outside of the study area and habitat connectivity will remain intact. It is unlikely the proposed action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	The study area is located within a modified grazing landscape where introduced plants and animals (Dingo, Feral Cat, Rabbit, Pig, Cane Toad and Brumby) have previously been identified (EcoSM, 2015). Overgrazing from domesticated herbivores and habitat degradation through invasive pasture improving species are recognised as current threats for this species. However, as the proposed action occurs within areas currently utilised for cattle grazing it is unlikely the proposed action will introduce additional invasive species or increase the presence of such species. Pest fauna species management is currently implemented at HCOC and will be maintained to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the species to decline	Throughout the entirety of the species distribution, with the exception of populations from South Australia and French Island (Victoria), Koalas are impacted by chlamydia (DoE, 2014b). Another disease identified to impact Koalas is the KoRV and up to 100% of Koalas in Queensland and New South Wales are identified to have KoRV (DAWE, 2022b). Due to the lack of recent records, there is no information available on disease prevalence for the local area of the proposed action. However, as chlamydia and KoRV is identified to impact populations of Koala across significant portions of its overall range it is unlikely that the proposed action will introduce further disease that would cause the species to decline within the local or broader area. Although not known to occur in the local area, phytophthora root fungus is a fungal disease that is known to impact on the health of eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in eucalypts, which this species relies on. Therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical

MNES endangered species criteria for significant impacts	Response to criteria
	to reducing the spread of this disease. Sufficient facilities and equipment are provided at HCOC for the washdown of machinery and vehicles and due to this it is unlikely that that there will be a decline in Koala due to introduced disease.
Interfere with the recovery of the species	The main objectives that are set out for the recovery of Koala, include: • The area of occupancy and estimated size of population that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased; • The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased; • Metapopulation processes are maintained or improved; and • Partners, communities and individuals have a greater role and capability in listed Koala monitoring, conservation and management. The removal of Koala habitat within the study area is will not maintain or increase the local population and due to this may interfere with the recovery of the species.
Conclusion	**Impacts to 595.8 ha of Koala habitat within the study area will be unavoidable and will adversely affect habitat critical to the survival of this species and may interfere with the recovery of the species. A significant residual impact will occur to Koala from development of the study area.**

3.6.2.5 Southern and Central Greater Glider

The Southern and Central Greater Glider (Petauroides *armillatus*) is listed under the EPBC Act as Greater Glider (southern and central; *Petauroides volans*) and is endangered under the EPBC Act. Habitat for this species is mapped within the study area. Significant impact assessments for this species from development of the study area are detail in.

The Southern and Central Greater Glider has been split from the nominate species (*Petauroides volans*) (McGregor *et al.*, 2020). As such, little specific information is currently available for this new species. However, the life history traits and habitat requirements of the Southern and Central Greater Glider remain similar to the nominate species and therefore habitat requirements and threats remain similar. Therefore, the relevant listing advice for the nominate species is relevant to the Southern and Central Greater Glider and will be referenced in this report in lieu of more species-specific information.

This species inhabits eucalypt-dominated coastal low open forests to tall forests in the ranges and low woodlands west of the Great Dividing Range (DCCEEW, 2022). Typically, this species is found in highest abundance in tall, montane, moist eucalypt forests with relatively old trees and abundant hollows, although distribution may be patchy even in suitable habitat. Home ranges of this species are typically relatively small, although ranges are larger in low-productivity forests and more open woodlands (DCCEEW, 2022). This is a folivorous species that primarily feeds upon eucalypt leaves and favours environments where multiple eucalypt species are present to account for seasonal variation (DCCEEW, 2022). The species is particularly vulnerable to habitat fragmentation as they require two to four dens for every 2 ha of suitable habitat and have low dispersal ability (DCCEEW, 2022).

The Greater Glider is also sensitive to logging and wildfire and is slow to recover following major disturbance.

There are no defined important populations of this species, therefore assessment must be undertaken on a case-by-case basis (DoE, 2013). The conservation advice for Greater Glider states that all populations of the Greater Glider (Southern and Central) are important for the conservation of the species across its range (DCCEEW, 2022; Eyre *et al.*, 2022). This species was recorded multiple times within HCOC and RE 11.3.25a is considered high-quality habitat for this species due to the floristic complexity, density, presence of hollow bearing trees and records of this species occurring either in or immediately adjacent to this vegetation community. It should be noted that the quality of RE 11.3.25a is not homogenous and changes throughout the ML. The southern portions of Hail Creek in the ML receives more surface water flows for a longer duration than the same vegetation community in the norther portion of the ML. This results in a much larger watercourse bed, larger and more mature trees that contain hollows and increased habitat features for Southern and Central Greater Glider. This species was encountered by SLR multiple times during monitoring of the existing offset areas at HCOC (southern portion of the ML) in large Blue Gum (*Eucalyptus tereticornis*) stands and numerous large hollows were observed. EcoSM (2015) recorded this species along most main channels of Hail Creek but was absent in the northern reaches and smaller tributaries. Within the study area, RE 11.3.25a occurs in the upper reaches of Hail Creek which likely results in a decrease in the availability and duration of surface water and trees may take longer to reach a mature stage where hollows begin to form as per the results of the field assessments. Although this species may have high quality foraging habitat throughout RE 11.3.25a, breeding opportunities in the study area are limited as few mature trees bearing hollows were recorded. The middle and southern sections of Hail Creek contain a greater abundance of mature trees that contain hollows. These areas are likely utilised for breeding by this species and occur outside of the study area. The majority of the study area is dominated by *Eucalyptus crebra* that due to its wood density, doesn't typically form hollows and is not considered to be foraging or breeding habitat for this species. Vegetation communities on landzone 3 (alluvial soils) recorded sparse to moderate amounts of tree hollows, however, the majority were recorded in the central and southern portions of the ML where taller more mature trees occurred. Due to the location of study area, the vegetation communities on the upper reaches of Hail Creek or on small tributaries contained fewer tree hollows. An impact assessment under the MNES endangered species guidelines is provided below(**Table 25**).

The Project design has been amended to avoid Southern and Central Greater Glider habitat where possible. The initial design impacted Southern and Central Greater Glider habitat on the northeast portion of Area 1, the eastern edge of Area 2 and the western edge of Area 3 (SLR, 2025 **Appendix A**). The design was amended to avoid these areas (see maps in **Appendix B13**). Avoidance measures were unable to be implemented to entirely avoid habitat for this species whilst still retaining the target resource. The final design impacts a total of 5.7 ha (0.5 ha of RE 11.3.25a, 5.2 ha of RE 11.3.4) of habitat for this species that could not be avoided, of which is considered high quality habitat. These small polygons of RE 11.3.25a and 11.3.4 (Area 2) are unable to be avoided. The polygon of RE 11.3.25a is small (0.5 ha) and is the northern extent of a much larger polygon that is to be avoided. RE 11.3.4 occurs adjacent to a polygon of RE 11.3.25a with approximately half of the polygon avoided by design. As the remaining portion of RE 11.3.4 connects to RE 11.3.25a that maintains connectivity to BWH and Hail Creek, it's unlikely that small reduction will impact Southern and Central Greater Glider. Connectivity in these areas are to be retained. It is unlikely that the small amount of clearing of RE 11.3.25a or 11.3.4 would significantly impact this species.

There are other portions of the study area that recorded the same vegetation communities, however, these areas are surrounded by open woodlands that isolate these areas, and its unlikely Southern and Central Greater Glider can access these areas. One is located within Area 2 (1.7 ha of RE 11.3.4) and the other within Area 4 (9.8 ha of RE 11.3.4). These areas contain some foraging habitat for this species but few tree hollows occur and due to their isolated locations, it's unlikely that these areas can be utilised by this species. Both of these areas are situated away from other areas of habitat and due to their location on small tributaries and that no records occur in these areas, it's unlikely that Southern and Central Greater Glider can reach these isolated areas of foraging habitat and impacts to these polygons would unlikely cause a significant impact to this species. Due to this, these areas are considered to be of low quality to the species. The remainder of habitat within Areas 1-4 (5.7 ha) occur as numerous small edges of much larger areas of habitat that will be avoided. As impacts will only occur to small edges of habitat, connectivity has been maintained within riparian vegetation and it's unlikely that impacts to these small areas scattered within Areas 1-4 will significantly impact this species. It is unlikely that the Project will significantly impact Southern and Central Greater Glider.

Table 25 Significant impact assessment for Southern and Central Greater Glider

MNES endangered species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of a population	The proposed action will impact a total of 5.7 ha of high quality Southern and Central Greater Glider habitat in Area 2. In the study area, these small polygons of habitat are part of larger remnant polygon that will be retained along with connectivity values and it is unlikely that the small amount of clearing would lead to a long-term decline in the size of a population of this species..
Reduce the area of occupancy of the species	The proposed action will impact a total of 5.7 ha of Southern and Central Greater Glider habitat but will not reduce the area of occupancy of this species as HCOC is not located on the edge of this species distribution. This species occurs along the Great diving range and in drier habitats to the west of the Great Dividing Range it is more confined to more dense and moist vegetation types, namely riparian vegetation. Extensive areas of similar vegetation communities occur in the local region that likely contain similar habitat qualities to those found in the project area. HNP contains approximately 115,800 ha of remnant and connected vegetation communities with numerous Southern and Central Greater Glider records (ALA, 2025) and is located adjacent to the project area. Impacts to Southern and Central Greater Glider habitat at HCOC constitutes approximately 0.00005 % of remnant vegetation communities associated with HNP alone and additional remnant vegetation communities occur immediately to the north and west of HCOC. These areas of remnant vegetation will be retained that will allow for continued connectivity for this species in the local area.
Fragment an existing population into two or more populations	It is unlikely that the small amount of clearing of 5.7 ha would fragment an existing population as no clearing will create a barrier to this species. The polygon of RE 11.3.25a is small (0.5 ha) and is the northern extent of a much larger polygon that is to be avoided. RE 11.3.4 occurs adjacent to a polygon of RE 11.3.25a with approximately half of this polygon avoided by design. The remaining portion of RE 11.3.4 connects to RE 11.3.25a that maintains connectivity to BWH and Hail Creek.

MNES endangered species criteria for significant impacts	Response to criteria
Adversely affect habitat critical to the survival of a species	DCCEEW (2025) states that habitat critical to the survival of the species is: • Large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species preferred food species in a particular region; • Smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization; • Cool microclimate forest/woodland areas (e.g., protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes); • Areas identified as refuges under future climate changes scenarios; and • Short-term or long-term post-fire refuges (i.e., unburnt habitat with or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas. The proposed action will impact a total of 5.7 ha of high-quality Southern and Central Greater Glider habitat in Area 2. These small polygons are unlikely to be considered as habitat critical to the survival of the species as they are small in size, the removal will not impact connectivity and movement, and they are not part of a refuge for this species. It is unlikely that impacts to 5.7 ha of habitat that occurs as small portions of much larger polygons that will be retained, will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	It is unlikely that the small amount of clearing will disrupt the breeding cycle of a population as connectivity will be retained. The edges of two polygons of habitat will be removed but connectivity with riparian vegetation will be retained. Additionally, the boundary of the clearing area will be demarcated to ensure no over clearing occurs, pre-clearance surveys will be undertaken, and a fauna spotter/catcher will be present during clearing. Due to this, it is unlikely that the Project will disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The current design avoids many areas of Southern and Central Greater Glider habitat. The remaining areas that could not be avoided are edges of larger polygons that will remain intact and maintain connectivity. Additionally, the boundary of the clearing area will be demarcated to ensure no over clearing occurs, pre-clearance surveys will be undertaken, and a fauna spotter/catcher will be present during clearing. As connectivity will be retained, it's unlikely that the reduction of 5.7 ha of habitat will impact upon the local population to the extent that the species is likely to decline.



MNES endangered species criteria for significant impacts	Response to criteria
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	The study area is located within a modified grazing landscape where introduced plants and animals have been identified EcoSM (2015). Threats from invasive species includes predation by feral cats and foxes and increased fuel loads from invasive flora species that increase the frequency and/or intensity of fires. As the study area is maintained as livestock grazing it is unlikely that the Project will introduce any additional invasive flora species or increase the presence of such species. The current weed monitoring program will be maintained to reduce any risk of non-native flora species being introduced or increasing in density. Additionally, pest species management of cats, fox and dingo's will continue to be implemented to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the species to decline	There are no known diseases that are a direct threat to this species. Phytophthora root fungus is a fungal disease that is known to impact on the health of eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in eucalypts, which this species relies on. Therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. The washdown of machinery and equipment is critical to reducing the spread of this disease. Sufficient facilities and equipment is provided at HCOC for the washdown of machinery and vehicles and due to this it is unlikely that that there will be a decline in Southern and Central Greater Glider due to introduced disease. Additionally, the current weed management activities will be continued to reduce the potential of novel species or increased densities occurring.
Interfere with the recovery of the species	It is unlikely that development within the study area will interfere with the recovery of this species; although, clearing of high-quality habitat has the potential to interfere with the following listed recovery objectives in the conservation advice (DCCEEW, 2022). • Protect and maintain sufficient areas of suitable habitat, including denning and foraging resources and habitat connectivity, to sustain viable subpopulations through the species' range; and • Avoid fragmentation and loss of habitat due to development of new transport corridors. Include consideration of the species in planning processes, and where possible re-locate recreational activities and roads away from habitat. However, the polygon of RE 11.3.25a (Area 2) is small in size (0.5 ha) and is the northern extent of a much larger polygon. Similarly, the portion of RE 11.3.4 in Area 2 (5.2 ha) is the terminus of a polygon with the remainder connected to riparian vegetation that connects BWH to Hail Creek. Due to its size and location, its unlikely to be a "sufficient area of suitable habitat" and would not

MNES endangered species criteria for significant impacts	Response to criteria
	lead to any fragmentation of Southern and Central Greater Glider habitat. Overall, it is unlikely that the small amount of clearing will interfere with the recovery of this species.
Conclusion	**Portions of habitat for this species including areas of connectivity have been avoided by design and other portions are isolated in the local environment and its unlikely that Southern and Central Greater Glider can access these areas. There is 5.7 ha of high-quality habitat in Area 2 that was unavoidable. It is unlikely that impacts to these areas of habitat will significantly impact this species as this habitat occurs as two edges of much large polygons that will be retained. Connectivity in both areas will be retained due to adjacent riparian habitat. Due to the small amount of clearing required, it is unlikely that the extent of impact to Southern and Central Greater Glider habitat from the Project would be considered significant.**

3.6.2.6 Ornamental Snake

Ornamental snake is listed as vulnerable under the EPBC Act. This species occurs in the Brigalow Belt bioregion with the core of this species distribution situated within the Fitzroy and Dawson Rivers drainage (DCCEEW, 2025). Preferred habitat for this species occurs in alluvial soils with deep cracks to shelter in and allows for the prevalence of its prey species, frogs. Habitat also occurs on the edges of wetlands, gilgai and moist areas in woodlands and open forests. This species is typically recorded in RE 11.4.3 but has been recorded in other RE's such as 11.4.6, 11.4.8, 11.4.9, 11.3.3 and 11.5.16. Within these vegetation communities, the following microhabitat features stated in DCCEEW (2025) are required:

- They are located within the lowest part of the catchment. The Ornamental Snake has been found in greatest numbers in shallow water where some aquatic vegetation is present, or where fringing groundcover vegetation has been inundated, especially in flooded gilgais where the dominant aquatic macrophyte is Bog Hyacinth (*Monochoria cyanea*);
- They have diversity of gilgai size and depth (if deep, then broad with gently sloping gradients at the sides);
- There are soils of high clay content and deep-cracking characteristics. Water retention capacity increases with an increase in the fine clay particle fraction of soils. This, in turn, influences certain habitat conditions that are important for the Ornamental Snake and the frog species it preys upon. Cracking clays with higher sand and more sodic cracking clays, often associated with Brigalow / Belah-dominated communities, have a lower fine clay particle fraction and are likely to have lesser water retention capacity;
- Ground timber is usually relatively common (especially piles adjacent to or close by to gilgais);
- Where burrowing frogs (*Cyclorana* species) are abundant; and
- Habitat patches are typically greater than 10 ha in area and are within, or connected, to larger areas of remnant vegetation.

This species is nocturnal and shelters under fallen timber, rocks, bark and deep soil cracks. Peak activity coincides with the wet season when prey species are abundant (DCCEEW, 2025).

This species was identified to occur in high-quality habitat areas during previous ecological assessments by EcoSM (2015) within HCOC. Species records and high-quality habitat occur >1 km to the west of Area 4 and are depicted in habitat mapping in **Appendix B11**. High quality habitat was ground-truthed as areas with well-developed gilgai, particularly with Brigalow overstory or where records of this species occur. This habitat type occurs outside of the Project. No other gilgai areas have been identified within the HCOC ML. Additional records have Ornamental Snake occurring at BWH. As this waterhole is permanent to semi-permanent depending on climatic conditions, it maintains a source of prey items (frogs) for Ornamental Snake.

State mapped essential habitat for this species occurs with RE 11.3.25a, 11.3.4, 11.4.2 and 11.9.7 within the study area (NRMMRRD, 2025). These areas were ground-truthed and recorded few habitat features for Ornamental Snake. No gilgai, cracking clay soils, semi-permanent water or extensive woody debris were present. These areas contained marginal microhabitat features for Ornamental Snake prey items which were similar to the open woodland communities encompassing the majority of the study area. These areas, State mapped as essential habitat, are of low quality for Ornamental Snake and they are unlikely to utilise these areas.

The DCCEEW considers that an occurrence of important habitat for this species is a surrogate for an ‘important population’ of the species. It is considered that species records within HCOC likely indicate preferred high-quality habitat for this species which would also equate to important populations. These important populations occur at BWH and adjacent to Hail Creek outside the project area. As this species was not recorded within State mapped essential habitat that occurs within the study area and these areas recorded few habitat features for this species, these areas are considered to be of low quality and not considered to contain an important population of this species. A MNES significant impact assessment is provided in **Table 26**.

Overall, all areas where important populations of this species occur at HCOC and areas of high-quality habitat have been avoided by design. A total of 83.5 ha of State mapped essential habitat occurs within the study area which is not considered to be an important population for this species. Essential habitat is State mapped across RE’s 11.3.4 and 11.4.2 which are not preferred vegetation communities for this species. Habitat features for Ornamental Snake were marginal in these areas, consistent with other areas of open woodland throughout the study area that were not mapped as essential habitat and no there are no records of this species in these areas. It is unlikely that Ornamental Snake would utilise these areas. As high-quality habitat and important populations have been avoided and connectivity has been maintained, it is unlikely that the Project will significantly impact Ornamental Snake.

Table 26 Significant impact assessment for Ornamental Snake

MNES vulnerable species criteria for significant impacts	Response to criteria
Lead to a long-term decrease in the size of an important population of a species	It is considered that species records within HCOC likely indicate preferred high-quality habitat for this species, which would also equate to important populations. High quality habitat occurs at BWH and adjacent to Hail Creek outside of the project area. As the study area does not incorporate any of the important population areas, or

MNES vulnerable species criteria for significant impacts	Response to criteria
	any areas where records occur, it is considered unlikely that disturbance to low quality habitat where no records occur would lead to a long-term decrease of an important population of this species.
Reduce the area of occupancy of an important population	As HCOC does not occur near the edge of this species know distribution, there is unlikely to be a reduction in the area of occupancy for this species from the clearing of low quality habitat that occurs in Area 2 as the surrounding vegetation communities around HCOC contain similar features as this area (open eucalypt woodland with no cracking soils and minimal woody debris). Similar habitat occurs in remnant vegetation to the west, north and east of HCOC and high-quality habitat occurs outside of the study area which will retain the extent of occurrence for this species in the local area.
Fragment an existing important population into two or more populations	Areas of important populations have been avoided by design. The clearing of low quality habitat for Ornamental Snake within the study area is unlikely to lead to the fragmentation of any important populations.
Adversely affect habitat critical to the survival of a species	All areas that contain high-value habitat and records of this species have been avoided by design. However, 83.5 ha of State mapped essential habitat for this species occurs within the study area that is considered low quality. The essential habitat mapped within Area 3 is a buffer created from the species records within BWH. All State mapped essential habitat areas were ground-truthed and recorded few habitat features for Ornamental Snake. No gilgai, cracking clay soils, semi-permanent water or extensive woody debris were present. These areas contained marginal microhabitat features for Ornamental Snake prey items which were similar to the open woodland communities encompassing the majority of the study area that are not mapped as essential habitat. These areas State mapped as essential habitat are of low quality for Ornamental Snake and they are unlikely to utilise these areas. It is unlikely that impacts to these areas would adversely affect habitat critical to the survival of a this species.
Disrupt the breeding cycle of an important population	The disturbance of low habitat is unlikely to disrupt the breeding cycle or isolate any populations as these areas are unlikely to be utilised by this species. Areas of high-quality habitat where this species and its prey species is likely to breed is avoided by design. Therefore, development of the study area is unlikely to result in a disruption to the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	High-quality habitat and areas where this species has been recorded have been avoided by design. All State mapped essential habitat areas were ground-truthed and recorded few habitat features for Ornamental Snake. No gilgai, cracking clay soils, semi-permanent water or extensive woody debris were present, and no records of this species occur in these areas. These areas contained marginal microhabitat features for Ornamental Snake prey items which were similar to the open woodland communities encompassing the majority of the study area that are not mapped as essential habitat. These areas State mapped as essential habitat are of low quality for Ornamental Snake, no records occur in these areas, and they are unlikely to utilise these low quality habitat areas. It is unlikely that impacts to low quality habitat would lead to a decline in this species.



MNES vulnerable species criteria for significant impacts	Response to criteria
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The study area is located within a modified grazing landscape where introduced plants and animals have been identified EcoSM (2015). Predation by feral pigs, dogs, foxes and cats are known threats to this species but it is unlikely that the proposed action will introduce additional invasive species or increase the abundance of such species. Pest fauna species such as foxes, dingo's and cats are currently managed at HCOC, and current practices will continue to reduce the threat to local biodiversity values from invasive pest fauna species. Therefore, invasive fauna species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the species to decline	There are no known diseases that impact Ornamental Snake, and it is unlikely that development of the study area would introduce any disease that would cause the population to decline.
Interfere with the recovery of the species	The main threats to this species are habitat loss and animal impacts. With the pest management plan in place, it is unlikely that development with the study area will increase pest fauna species. Habitat loss is associated with population of high conservation priority which equates to important populations. These areas at HCOC have been avoided by design. As these higher quality areas are avoided, it is unlikely that disturbance to low quality habitat within the study area will interfere with the recovery of the species.
Conclusion	**All areas of high-quality habitat have been avoided by design. 83.5 ha of State mapped essential habitat occurs within the study area. However, as this species was not recorded in these areas during field assessments, no records of this species occurs in these areas of essential habitat, few habitat features for Ornamental Snake were recorded in these areas and similar habitat features were present throughout the study area and local area, they are considered low quality habitat for Ornamental Snake and this species is unlikely to utilise these areas. It is unlikely that impacts to low quality habitat will cause a significant impact to this species.**

3.7 Summary

Significant residual impacts will occur to some MSES and MNES. A summary of those matters and quantification of significant residual impacts is provided in **Table 27**.

Table 27 Summary of environmental matters and quantification of significant residual impacts

Environmental Matter	Type of matter for which significant residual impact was assessed	Significant impact	Quantity (ha)
Regulated Vegetation (of concern *Vegetation Management Act 1999* (VM Act) status)	MSES	Yes	15.0 ha of RE 11.3.4 82.1 ha of RE 11.4.2 4.0 ha of RE 11.9.4 171 ha of RE 11.9.7 **Total of 272.1 ha**

Environmental Matter	Type of matter for which significant residual impact was assessed	Significant impact	Quantity (ha)
Vegetation Associated with a Watercourse	MSES	Yes	0.5 ha of RE 11.3.25 4.0 ha of RE 11.3.4 0.8 ha of RE 11.4.2 8.1 ha of RE 11.9.2 10.9 ha of RE11.9.7 23.9 ha of RE 11.9.9 **Total of 48.2 ha**
Connectivity	MSES	Yes	**599.8 ha**
Squatter Pigeon (Southern)	MSES and MNES (Overlapping prescribed matter)	Yes	**595.8 ha**
Koala	MSES and MNES (Overlapping prescribed matter)	Yes	**595.8ha**
White-throated Needletail	MSES and MNES (Overlapping prescribed matter)	No	
Glossy Black-Cockatoo	MSES	No	
Southern and Central Greater Glider	MSES and MNES (Overlapping prescribed matter)	No	
Ornamental Snake	MSES and MNES (Overlapping prescribed matter)	No	
Short-beaked Echidna	MSES	No	
Black Ironbox[1]	MNES	No	
SEVTs of the Brigalow Belt TEC	MNES	No	
Brigalow TEC	MNES	No	

1. At the time of submission this species was only listed under the EPBC Act but during the approvals process it was uplisted under the NC Act.

4.0 Quality Scores

4.1 Site-based Condition Scores

Raw data used to calculate BioCondition scores can be found in **Appendix C** (**Tables C1 – C8**). Average BioCondition scores recorded some variation between RE's and the total score out of ten ranged from six to nine (**Table 28**). RE 11.9.4 recorded the lowest score (six) while RE 11.4.2 recorded the highest score (nine). Within each RE little variation was recorded between assessment sites indicating that the quality of each RE was similar through its distribution. The exceptions were RE 11.3.4 and RE 11.9.2. BioCondition scores within RE 11.3.4 ranged between 47 (BioCondition site 13) and 68 (BioCondition site 7). BioCondition site 7 scored much higher compared to all other sites due to a high percentage of native perennial grass cover and a very low percentage of weed cover (**Table B2**). BioCondition scores within RE 11.9.2 ranged between 49.5 (BioCondition site 11) and 68 (BioCondition site 15). BioCondition site 11 scored much lower compared to all other sites due to a low percentage of native perennial grass cover, a low number of large eucalypts present and a higher percentage of weed cover (**Table B5**).

Table 28 Average BioCondition scores for REs and their BVG

BioCondition Scores	RE 11.3.4	RE 11.3.25a	RE 11.4.2	RE 11.9.2	RE 11.9.4	RE 11.9.7	RE 11.9.9
BVG	16c	16a	17a	17b	7a	17a	13c
Average BioCondition score	69	69	85	74	61	70	7
BioCondition score out of 10	7	7	9	7	6	7	7

4.2 Species Habitat Attributes

For those prescribed environmental matters that will likely result in a significant impact, the raw data used to calculate species habitat scores can be found in **Appendix D** (**Tables D2 – D3**). **Table 29** below contains the average habitat score for each conservation significant species per habitat type (RE) and an overall habitat score out of ten. Scores for Koala habitat recorded some variation between RE's and ranged from an overall score of four to six. Scores for Squatter Pigeon (Southern) habitat were fairly consistent between RE's and ranged from five to six.

Table 30 combines BioCondition and habitat condition scores for each conservation significant species to determine an overall final habitat quality score to be used for any land-based offset liability. Habitat quality for Koala recorded a score of six and habitat quality for Squatter Pigeon (Southern) recorded a score of six.

Table 29 Average species habitat scores for each threatened fauna species and vegetation community

		RE 11.3.4	RE 11.3.25a	RE 11.4.2	RE 11.9.2	RE 11.9.7	RE 11.9.9
Koala							
Average Habitat score		57.2	59	54.3	41.1	43.8	42.5
Habitat score out of 10		6	6	5	4	4	4
Squatter Pigeon (Southern)							
Average Habitat score		53.5	45.9	62.8	60.2	41.1	59.3
Habitat score out of 10		5	5	6	6	5	6

Table 30 Combining the average BioCondition and habitat condition scores for each conservation significant species to determine the final habitat quality score

Conservation Significant Species	RE 11.3.4	RE 11.3.25a	RE 11.4.2	RE 11.9.2	RE 11.9.4	RE 11.9.7	RE 11.9.9	Calculation	Rounded Final Score
Koala	(7+6)/ 2 = 6.5	(7+4)/2 = 5.5	(9+5)/2 = 7	(7+4)/2 = 5.5	-	(7+4)/2 = 5.5	(7+4)/2 = 5.5	(6.5+5.5+7+5.5+5.5+5.5)/6 = 5.9	6
Squatter Pigeon (Southern)	(7+5)/2 = 6	(7+5)/2 = 6	(9+6)/2 = 7.5	(7+6)/2 = 6.5	-	(7+5)/2 = 6	(7+6)/2 = 6.5	(6+6+7.5+6.5+6+6.5)/6 = 6.4	6

5.0 Offset Mechanisms

Significant residual impacts to MSES and MNES will require environmental offsets for State and Commonwealth approvals.

5.1 Queensland Environmental Offsets

The Queensland Environmental Offsets Policy provides multiple mechanisms for delivering an environmental offset to counterbalance a significant residual impact on MSES, the main mechanisms including:

- Proponent-driven land-based offset;
- Financial settlement offset; and
- Combination offset (part proponent driven part financial).

The policy also establishes the use of registered advanced offsets, especially within Strategic Offset Investment Corridors, and, in the future, government approved Direct Benefit Management Plans. Proponent driven land-based offsets can draw on registered advanced offsets made by others if the land is suitable. The advanced offset register can be examined online:

(https://www.qld.gov.au/environment/management/environmental/offsets/tools/eoi-list)

5.1.1 Proponent-driven Land-based Offset

For proponent-driven offsets, the offset delivery liability remains with the proponent, and the offset must be delivered in accordance with an *Offset delivery plan* approved by the administering agency. In this case, the offset is to result in a conservation outcome for the impacted prescribed environmental matters and is to be delivered on land:

- Owned by the proponent; or
- Subject to contractual arrangement between the proponent and offset provider(s), and any other relevant third party for delivery of the offset.

A proponent delivering an offset is responsible for any costs associated with meeting the offset requirement and retains ongoing responsibility for ensuring the offset is delivered in accordance with the relevant offset delivery plan. The proponent can enter into contractual arrangements with an offset provider, who would then be responsible for delivering the offset under the terms of the contract.

For land-based offsets, the suitability of the offset site relative to the impact site and the prescribed environmental matters, is measured through undertaking a habitat quality analysis. For offsets relating to REs and species, *The Guide to Determining Terrestrial Habitat Quality* must be used for this analysis, unless an alternative approach for measuring a conservation outcome is approved by DETSI.

A land-based option in this instance would include a voluntary declaration application for land under the VM Act. The application would need to be accompanied by an environmental offset agreement and offset delivery plan, which are designed to achieve a conservation outcome. This may include managing an area of land to improve habitat quality conditions for conservation significant species.

5.1.2 Financial Settlement Offset

A proponent can meet an offset requirement for significant residual impacts by providing a payment in accordance with the Queensland Environmental Offsets Policy. The web-based Financial Settlement Offset Calculator on the Queensland Government website can be used to determine financial settlement liability.

5.1.3 Combination Offset

A combination offset consists of part proponent-driven offset and part financial settlement offset. This may be the preferred option if a proponent has land available that is suitable for part, but not all, of the offset obligation. In this instance, a proponent-driven offset can be delivered on the available land, and the remaining obligation can be provided through a financial settlement offset. The web based Combined Offset Calculator can be used to calculate the percentage breakdown of a combined proponent driven and financial settlement offset calculation:

(https://www.qld.gov.au/environment/management/environmental/offsets/delivering/delivering-combination)

5.1.4 Overlapping Offset Requirements

The Queensland Offsets Act requires that the State or Local Government cannot impose an offset condition for the same or substantially the same impact if the Commonwealth has completed its assessment for a controlled action. This applies regardless of whether the Commonwealth has decided that an offset is, or is not, required (DES, 2021).

5.2 EPBC Act Offsets

A referral under the EPBC Act is required for any significant impacts to a MNES. The EPBC Act Offset Policy (DSEWPC, 2012) provides guidance on offset requirements resulting from a controlled action decision following an EPBC referral to the Commonwealth for significant adverse impacts on EPBC protected matters. Mechanisms under this policy and its supporting guidelines for offset provision include:

- Direct offsets (land-based, catch and release, breeding or threat abatement programs) to achieve a minimum of 90 % of the offset requirement;
- Other compensatory measures (for example funding for research or educational programs) that relate to the protected matter; and
- Advanced offsets (for example the protection or improvement of habitat for the conservation of a protected matter before an impact is undertaken).



6.0 Final Score and Offset Liability

Significant residual impacts will occur to environmental matters from the development of the study area and environmental offsets will likely be required through the State and Commonwealth approvals process. A land-based approach is required for significant residual impacts to MNES, and a land-based approach should take precedence for MSES as these can be co-located in a single or multiple offset areas. Any residual MSES not covered by a land-based approach can then be sought through a financial settlement.

6.1 Combination Offset for MSES

A land-based offset will primarily be sought for those State prescribed environmental matters where a significant residual impact will occur (**Table 27**). Any proposed offset area for MNES can also be ground-truthed for those prescribed environmental matters in **Table 27**. Any residual quantity for those prescribed environmental matter not covered by a land-based option may be sought through the DETSI web-based financial settlement offset calculator.

6.2 Land-based Offset for MNES

A referral and subsequent approval under the EPBC Act is required for significant impacts to MNES. Overlapping significant environmental matters within the study area where a significant impact under the EPBC Act have been identified as likely to occur include Koala and Squatter Pigeon (Southern) habitat (**Table 31**). Given that significant impacts to MNES will occur within the study area, offsets in accordance with EPBC Act offset policy will be required. Note that there is a minimum of a 90 % land-based offset mechanism required under the EPBC Act offset policy. Multipliers for land area are determined via a number of parameters, many of which are dependent on attributes of a suitable offset land parcel and will therefore be determined when additional information from the offset strategy is available.

Table 31 The quantity and quality of MNES habitat where a significant impact has been identified

MNES	Quantity impacted (ha)	Quality
Koala	595.8	6
Squatter Pigeon (southern)	595.8	6

6.3 Potential Offset Area

HCOC are investigating the suitability of adjacent land parcel Lot 13 on Plan WHS466 to offset significant residual impacts to MSES and significant impacts to overlapping MNES. The potential offset area is owned by HCC and adjoins HCOC in the north of the ML. This potential offset area contains high connectivity values. The majority of the offset area contains a SBC and its associated buffer zone and borders HNP, on its eastern border. This area acts as a link by allowing large areas of remnant vegetation along the Great Diving Range and HNP in the east, to connect to other tracts of remnant vegetation to the west of Hail Creek. A field assessment was conducted between 6 and 19 November 2023 to ground-truth vegetation communities, conduct condition assessment for conservation significant species and communities and map conservation significant species habitat within the proposed offset area.

A total of 16 REs were ground-truthed throughout the potential offset area that equate to 6,226.2 ha of remnant vegetation. An additional 421.6 ha occurs as regrowth vegetation. A total of four conservation significant species were recorded within the study area. Squatter

Pigeon (Southern) were recorded on multiple days near the northern boundary of the study area, and an active nest was also located in this area, indicating that breeding habitat occurs for this species. Overall, 5,706 ha of Squatter Pigeon (southern) habitat was mapped in the offset area. Multiple Koala were recorded throughout the potential offset area in a variety of RE's. Overall, 5,706 ha of Koala habitat were mapped in the offset area. Black Ironbox was recorded in four watercourses, that equate to RE 11.3.25a with a total area of 49 ha. A Black-faced Monarch (*Monarcha melanopsis*), listed as special least concern under the VM Act and migratory under the EPBC Act at the time of writing, was recorded in riparian vegetation (RE 11.3.25/a). State mapped essential habitat for Ornamental Snake was mapped in the offset area and 163.0 ha was ground-truthed to contain sufficient habitat features for this species. **Table 32** summaries MSES and MNES that were identified within the offset area.

Table 32 Environmental matters impacted by project and present within potential offset area

Environmental Matter	Environmental matter impacted	Quantity in the offset area (ha)
Regulated vegetation and regulated vegetation within the defined distance of a watercourse	RE 11.3.4	55.2
	RE 11.3.25a	57.6
	RE 11.4.2	2.5
	RE 11.9.4	289.7
	RE 11.9.7	38.9
	RE 11.9.9	1658
Connectivity		6,226.3
Ornamental Snake[1]		163.1
Koala		5,706.9
Squatter Pigeon (southern)		5,706.9
Southern and Central Greater Glider[1]		158.5
Black Ironbox[1]		49.1
Brigalow TEC[1]		2.2
SEVT TEC[1]		471.4

1 indicates a significant residual impact and subsequent offset requirement are unlikely for this species

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Appendix A Initial Ecological Assessment Report (SLR, 2025)

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

SLR Project No.: 626.30128.00000

17 December 2025

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

Prepared by:

SLR Consulting Australia

SLR Project No.: 626.30128.00000

26 November 2025

Revision: 9.0

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5.0	19 July 2024	Scott Harte	Mike Youdale	Emma Williams
4.0	9 July 2024	Erin Brown	Richard Floyd	Emma Williams
3.0	28 February 2024	Scott Harte	Emma Williams	Emma Williams
2.0	21 December 2023	Scott Harte	Dave Hall	Emma Williams
1.0	17 April 2023	Scott Harte	Dave Hall	Dave Hall

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Hail Creek Coal Holdings Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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Acronyms and Abbreviations

ALA	Atlas of Living Australia
BD Status	Biodiversity Status
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science (now known as DETSI)
DESI	Department of Environment, Science and Innovation (now known as DETSI)
DETSI	Department of the Environment, Tourism, Science and Innovation
DEWHA	Department of the Environment, Water, Heritage and the Arts
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DoR	Department of Resources
DRDMW	Department of Regional Development, Manufacturing and Water
EA	Environmental Authority
EO Reg	*Environmental Offsets Regulation 2014*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
GCAA	Glencore Coal Assets Australia
GPS	Global Positioning System
ha	Hectares
HCC	Hail Creek Coal Holdings Pty Limited
HCOC	Hail Creek Open Cut
HES	High Ecological Significance
HNP	Homevale National Park
km	kilometres
KoRV	Koala Retrovirus
LFC	Landscape Fragmentation and Connectivity
ML	Mining Lease
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significant
Mtpa	Million tonnes per annum
NC Act	*Nature Conservation Act 1992*
PET	Plecoptera/ Ephemeroptera/ Trichoptera
PMST	Protected Matters Search Tool
RE	Regional Ecosystem
RoM	Run of Mine
SEVT	Semi-evergreen Vine Thickets

SLR	SLR Consulting Australia Pty Ltd
TEC	Threatened Ecological Community
VM Act	*Vegetation Management Act 1999*
WO	WildNet Online

1.0 Introduction

The Hail Creek Open Cut Mine (HCOC) is owned by Hail Creek Coal Holdings Pty Ltd (HCC), Sumisho Coal Development Queensland Pty Ltd and Marubeni Coal Pty Ltd (Hail Creek Joint Venture) and is operated by Hail Creek Coal Pty Ltd (a subsidiary of Glencore Coal Assets Australia (GCAA)). HCOC is an open cut operation where coal is mined using conventional open-cut strip-mining methods, with approval to produce up to 20 million tonnes of Run of Mine (RoM) coal per annum (Mtpa RoM). Coal is also approved to be mined by underground methods, however to date, the mine has not utilised underground mining methods. HCOC is operated under an Environmental Authority (EA) EPML00661913 on Mining Leases (MLs) 4738 and 700026. HCOC is located in the Isaac Regional Council Local Government Area, approximately 85 kilometres (km) southwest of Mackay and 35 km northwest of Nebo.

HCC have proposed an amendment to their EA to develop portions of the Hail Creek Eastern Margin Expansion Project (the Project). These EA amendment areas occur outside of the existing approved disturbance and collectively form the study area for this Ecological Assessment Report. The study area comprises the following four distinct assessment areas (**Figure 1**):

- Area 1 (approximately 10.6 hectares (ha)) – two small polygons (approximately 8.8 ha and approximately 1.8 ha) in the northern portion of ML4738 that form part of the proposed Kemmis Pit extension;
- Area 2 (approximately 139.4 ha) – incorporates the proposed Homevale Pit in the northern portion of ML4738;
- Area 3 (approximately 141.8 ha) – proposed Exevale Pit extension immediately south of Area 2 within ML4738; and
- Area 4 (approximately 415.5 ha) – proposed Carrinyah Pit extension in the southeastern corner of ML4738.

SLR Consulting Australia Pty Ltd (SLR) were engaged to undertake a desktop and field-based assessment of terrestrial and aquatic ecology matters within the study area to determine the presence of Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES) and their implications for Project environmental approvals and environmental offset liability. Terrestrial and aquatic groundwater-dependent ecosystems were assessed in a separate study (SLR, 2024) and are not included in this report.

638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

Area 1
Area 2
Area 3
Area 1
Area 4
ML700026
ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

ECOLOGY STUDY AREA

LEGEND

- EA Amendment Proposed Extent of Disturbance
- Mining Lease

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	19-Mar-2025
Drawn by:	AS

SLR

\\au.slr.local\Corporate\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Ecological Assessment Report\SLR62630128 Hail Creek Major EA Amendment - Ecology Study Area.mxd

1.1 Purpose

The purpose of this Ecological Assessment Report is to identify terrestrial and aquatic ecology matters relevant to State and Commonwealth environmental approvals for the Project.

The eastern portion of the Hail Creek ML4738, including the study area for this report, has been subject to extensive previous ecological assessment. Ecological Survey and Management (EcoSM) prepared a Terrestrial Ecology Assessment Report (EcoSM, 2015) for the Hail Creek Transition Project. EcoSM (2015) completed detailed mapping and assessment of terrestrial ecology matters within the Project area, including the study area for this current report.

This current Ecological Assessment Report provides a review of the previous Terrestrial Ecology Assessment Report (EcoSM, 2015) and includes contemporary desktop and field assessments to map and characterise MSES and MNES terrestrial and aquatic ecology matters. Significant impact assessments have been performed for those matters relevant to the Project to identify potential environmental offset liability and opportunities for biodiversity conservation and impact avoidance and mitigation. Additionally, BioCondition and habitat condition assessments were conducted throughout the study area to determine the habitat quality of listed vegetation communities and species (Eyre *et al.*, 2015). The results of these assessments will be used for offset calculations where relevant and are included in the 2025 SLR Ecology Impact Assessment Report.

1.2 Legislative Background

1.2.1 Commonwealth legislation

1.2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework for the protection of nationally significant (protected) animals, plants, habitat and places. The EPBC Act covers nine (9) protected matters, also known as MNES:

- Listed threatened species and communities;
- Listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine environments;
- World heritage properties;
- National heritage places;
- The Great Barrier Reef Marine Park;
- Nuclear actions; and
- A water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, a ‘significant impact’ as relevant to MNES is defined as an impact which is important, notable, or of consequence, having regard to its context or intensity. Where an action is likely to have a significant impact on a MNES the action must be referred to the Commonwealth Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act. To determine whether an action is likely to

have a significant impact, guidelines have been developed for self-assessment (DEWHA, 2013). The significant impact guidelines provide overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBC Act.

1.2.2 State legislation

1.2.2.1 Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) is administered by the Queensland Department of Resources (DoR) (now known as Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)) and protects Queensland's biodiversity by conserving native vegetation and addressing land degradation issues.

Queensland's vegetation management framework regulates the clearing of certain native vegetation. The VM Act incorporates the Regional Ecosystem (RE) classification scheme to regulate the clearing of native vegetation. REs are remnant vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Remnant vegetation is defined under the VM Act as vegetation where the dominant canopy layer has greater than 70 % of the height and greater than 50 % of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

The Queensland Herbarium has mapped the remnant extent of REs for much of the state using a combination of satellite imagery, aerial photography and on-ground studies (ground-truthing). RE maps published by DNRMMRRD describe the extent and conservation status of remnant vegetation as REs. REs are classified in the following VM Act class and Biodiversity status (BD status) categories:

- Remnant Vegetation—Category B:
  - Endangered - less than 10 % remains;
  - Of Concern - 10 - 30 % remains; and
  - No Concern at Present - 30 % remains, >10,000 ha remains.
- Regrowth:
  - High Value Regrowth - Category C;
  - Reef Regrowth Watercourse Veg - Category R; and
- Non-remnant - Category X.

The classification of REs is relevant to identifying vegetation communities of conservation significance in a regional context, including those classified as Ecologically Significant Areas, and potential environmental offset requirements under the Queensland environmental offsets framework.

In association with the VM Act, essential habitat mapping is available for protected flora and fauna, encompassing areas that the chief executive reasonably believes are areas of essential habitat. Essential habitat is mapped over areas of remnant vegetation, usually within 2.5 km of a reported location of a threatened species, that are likely to contain either three or more essential habitat factors for the relevant species, or presence of the relevant species at any stage of its life cycle. Essential habitat factors for protected flora and fauna incorporate components of a species habitat and can be characterised by a landform,

pollinator, RE, soil type and water body that is necessary or desirable for the species at any stage of its life cycle.

1.2.2.2 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) is administered by the Department of Environment, Tourism, Science and Innovation (DETSI) and provides the framework for the declaration and management of protected areas, and protection of wildlife listed under the Nature Conservation (Animals) Regulation 2020 and the Nature Conservation (Plants) Regulation 2020.

Protected areas

Protected areas are declared under the NC Act for the conservation of Queensland's natural and cultural resources. Classes of protected areas under the NC Act include national parks, regional parks and nature refuges. An environmental offset may be required for actions resulting in significant residual impacts within a protected area.

Under the Queensland environmental offsets framework, an impact on a protected area is significant if a prescribed activity results, or is likely to result, in one or more of the following:

- Authorised clearing or inundation of all or part of the protected area for the construction of private or publicly owned infrastructure on the area;
- The exclusion of, or reduction in, the public use or enjoyment of all or part of the protected area; and
- A reduction in the natural or cultural values of all or part of the protected area.

Protected wildlife

The purpose of the NC Regulation is to prescribe wildlife as one of the following classes of wildlife:

- Extinct in the wild;
- Endangered;
- Vulnerable;
- Near threatened; and
- Least concern.

Threatened wildlife under the NC Act is wildlife that is prescribed under the Act as extinct in the wild, endangered or vulnerable. All native flora and fauna species are protected under the Act, and 'permits to take' protected wildlife are required from DETSI.

DETSI provides the WildNet Online database (WO), which can be searched to generate a list of all species recorded within a specified area. This tool is useful for determining the presence or likelihood of occurrence of threatened species in an area.

1.2.2.3 Biosecurity Act 2014

The *Biosecurity Act 2014* commenced on 1 July 2016 with the aim to ensure a consistent, modern, risk-based and less prescriptive approach to biosecurity in Queensland. The *Biosecurity Act 2014* replaced the many separate pieces of legislation that were previously used to manage biosecurity. Under this Act, the Biosecurity Regulation 2016 sets out how the Act is implemented and applied.

Under the *Biosecurity Act 2014*, there are three types of invasive plant species:

- Prohibited invasive plants;
- Restricted Invasive plants; and
- Invasive plants.

Prohibited invasive plants are not considered to be present in Queensland and would seriously threaten Queensland's primary industries, natural environment, livestock, human health and people's livelihoods. If a prohibited invasive plant is found in Queensland, it must be reported to Biosecurity Queensland within 24 hours of the sighting.

Restricted invasive plants also seriously threaten Queensland's primary industries, natural environment, livestock, human health and people's livelihoods, but are already established in Queensland. Under the *Biosecurity Act 2014*, restricted invasive plants may fall into one or more categories, with different restrictions relevant to each category.

Restricted invasive plant categories and restrictions:

- Category 2: the invasive plant must be reported within 24 hours Biosecurity Queensland;
- Category 3: the invasive plant must not be distributed or released into the environment;
- Category 4: the invasive plant must not be moved; and
- Category 5: the invasive plant must not be kept.

Invasive plants include species that are not listed as prohibited or restricted invasive plants, but the species has, or is likely to have, an adverse impact on a biosecurity consideration because of the introduction, spread or increase in population size of the species in an area. Everyone is required under their 'general biosecurity obligation' to take all reasonable and practical steps to minimise the risks associated with invasive plants under their control. Under the Act, local governments are required to have a Biosecurity Plan for managing biosecurity matters within its local government area and may also declare additional pest species using a local law under the *Local Government Act 2009*. Local governments and Biosecurity Queensland provide weed control support services but may also enforce landowner responsibilities if necessary.

Invasive animals are classified in a similar manner to plants and include prohibited and restricted classifications. Landholder responsibilities and restrictions pertaining to these classifications are specific for each category and an invasive animal may be listed under multiple categories. Category actions that must, or must not, be carried out are defined under the *Biosecurity Act 2014*, however, additional obligations may be specified in the relevant local government Biosecurity Plan.

1.2.2.4 Queensland environmental offset framework

The Queensland Environmental Offsets Regulation 2014 (EO Reg) defines prescribed environmental matters, including MSES as follows:

- Regulated vegetation;
- Connectivity areas;
- Wetlands and watercourses;
- Protected wildlife habitat;

- Koala habitat in South East Queensland;
- Protected areas;
- Fish habitat areas and highly protected zones of state marine parks;
- Waterway providing for fish passage;
- Marine plants; and
- Legally secured offset areas.

A ‘significant residual impact’ under the EO Reg as relates to MSES is defined as an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:

- Remains, or will or is likely to remain (whether temporary or permanently) despite on-site avoidance and mitigation measures for the prescribed activity; and
- Is, or will or is likely to be, significant.

After measures to avoid and mitigate impacts are taken and there is still an impact on prescribed environmental matters, an offset may be required. To determine whether an impact is likely to have a significant residual impact, guidelines have been developed (DEHP, 2014). For any new development, all impacts to MSES must be avoided or minimised where possible. Where there is a significant residual impact to MSES (as determined through the application of the guideline), an environmental offset may be required in accordance with the Queensland Environmental Offsets Policy (DESI, 2024).

2.0 Methods

2.1 Literature Review and Previous Studies

A key component to this assessment is the review of previous terrestrial ecology assessment results from HCOC, particularly EcoSM (2015) undertook comprehensive ecological assessments for the entire HCOC area including the study area.

Assessment of significant impacts to MNES and MSES was previously undertaken by EcoSM (2015) for the Hail Creek Transition Project. Overall, it is considered that previous assessments undertaken by EcoSM (2015) are an important dataset in informing the likelihood of significant impacts to MNES and MSES for the Project study area and results of these assessments are referenced and discussed, in conjunction with contemporary studies, in the following sections of this report.

SLR had completed previous aquatic surveys from the Bee Creek catchment (SLR Consulting, unpublished data 2024) which runs southwest of the Project area. Hail Creek and Bee Creek form a confluence on the southeast corner of the ML, therefore it is assumed that these two catchments have similar aquatic biodiversity. Results of this previous assessment are referenced and discussed in the following section of this report.

2.2 Database Searches

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) (DCCEEW, 2025) (**Appendix A1**) and the Queensland DETSI's WO (DETSI, 2025b) (**Appendix A2**) database were utilised to gather contemporary desktop information to determine listed species, communities and areas of conservation significance relevant to the Project and compare with the outcomes of EcoSM (2015). Both searches included a 10 km buffer around a central polygon covering the study area (-21.4818° S, 148.4083° E), which includes the entirety of the study area and a large buffer incorporating similar habitat in the surrounding landscape.

The Department of Regional Development, Manufacturing and Water (DRDMW) stream gauging station database were utilised to gather contemporary desktop information to compare the flow of watercourses within the general vicinity of the Project area (DRDMW, 2024). Atlas of Living Australia (ALA) (ALA, 2025) and Wetland Info (DETSI, 2025a) was used to gather contemporary data on aquatic biotic (turtles, fish, macroinvertebrates and aquatic plants) within the study area.

2.3 Mapping

The following mapping resources were reviewed as part of the desktop analysis:

- Queensland Globe interactive mapping (QLD Globe, 2025) including:
  - Surface geology mapping;
  - Atlas of Australian Soils mapping;
  - Protected plants flora survey trigger mapping;
  - Essential habitat mapping;
  - MSES mapping; and
  - Protected areas.
- DNRMMRRD reports:

- Regulated Vegetation Management Maps.

2.4 Field Assessment

Terrestrial field assessments within the study area were conducted by SLR between 1 - 5 November 2022 and 8 - 9 March 2023. Multiple surveys were conducted including:

- Refinement of RE mapping;
- BioCondition assessments;
- Habitat condition assessments;
- Threatened Ecological Community (TEC) threshold condition assessments; and
- Amending threatened flora habitat mapping.

Methodology and results for BioCondition and habitat condition assessments are provided in the 2025 SLR Ecology Impact Assessment Report for offset calculations.

2.4.1 Black Ironbox

Where Black Ironbox (*Eucalyptus raveretiana*) were observed outside of the ground-truthed habitat mapping by EcoSM (2015) during the November 2022 and March 2023 surveys, habitat for this species was mapped using a handheld Global Positioning System.

2.4.2 TEC Assessments

For REs that equate to EPBC Act listed TECs, assessments were conducted as per the Commonwealth Listing Advice and/or Conservation Advice for that community. Within each polygon of RE 11.9.4, diagnostic characteristics were recorded to determine the presence of the Semi-evergreen Vine Thickets of the Brigalow Belt (north and south) and Nandewar bioregions (SEVTs of the Brigalow Belt TEC). Within the mapped RE 11.9.5, diagnostic characteristics and condition thresholds were recorded to determine the presence of the Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC).

3.0 Results

3.1 Regulated Vegetation

3.1.1 Regional Ecosystems

Vegetation communities within the study area were previously ground-truthed by EcoSM (2015) and were used for this report. Only three small discrepancies in that ground-truthed vegetation mapping were recorded during field assessments by SLR in November 2022. One small polygon (approximately 0.9 ha) mapped as RE 11.9.2 was ground-truthed as RE 11.3.4. Another small polygon (approximately 1.7 ha) previously mapped as RE 11.9.2 was ground-truthed in November 2022 as RE 11.9.4. A small polygon (0.7 ha) of RE 11.3.2 was ground-truthed as 11.9.7. The ground-truthed REs present within the study area and their status under the VM Act are listed in **Table 1**.

Table 1 REs ground-truthed within the study area

RE code	VM Act[1] status	BD Status	Structural category
11.3.4	Of concern	Of concern	Sparse
11.3.25a	Least concern	Of concern	Sparse
11.4.2	Of concern	Of concern	Sparse
11.9.2	Least concern	No concern at present	Sparse
11.9.4	Of concern	Endangered	Dense
11.9.5	Endangered	Endangered	Mid-dense
11.9.7	Of concern	Of concern	Sparse
11.9.9	Least concern	No concern at present	Sparse

1. VM Act status refers to that under the *Vegetation Management Act 1999*

REs with an 'Of concern' or 'Endangered' VM Act status are a prescribed environmental matter and a significant residual impact to this matter may incur offset liability under the Queensland environmental offset framework.

3.1.2 Essential Habitat

Essential habitat is a prescribed environmental matter and is State-mapped within the study area for Ornamental Snake (*Denisonia maculata*), Squatter Pigeon (Southern) (*Geophaps scripta scripta*) and Southern and Central Greater Glider (*Petauroides volans (armillatus))* (Greater Glider), incorporating the following approximate areas:

- Approximately 154 ha of essential habitat for Ornamental Snake;
- Approximately 4.5 ha of essential habitat for Squatter Pigeon (Southern); and
- Approximately 4.5 ha of essential habitat for Southern and Central Greater Glider.

Essential habitat for Ornamental Snake is State-mapped within Areas 1 - 3 (**Appendix A5**). Field assessments supported the majority of State mapping and indicated that three essential habitat factors including the mandatory RE shown in the Vegetation Management Report (DNRMMRRD, 2025) were present for each species. The exceptions were as follows:

- Ornamental Snake - in Areas 2 and 3, RE 11.9.9 is not a mandatory essential habitat factor for this species and is not essential habitat for Ornamental Snake.

A significant residual impact to essential habitat for an animal that is endangered or vulnerable may incur offset liability under the Queensland environmental offset framework.

3.1.3 Remnant Vegetation Associated with a Watercourse

Remnant vegetation associated with a watercourse shown on the VM Act watercourse and drainage feature map is classified as a MSES under the Queensland environmental offsets framework. Several ground-truthed remnant REs within the study area are associated with a watercourse shown on the Vegetation Management Watercourse and Drainage Features Map (**Appendix A6**). Clearing of remnant vegetation associated with a VM Act watercourse or drainage feature may incur offset liability under the Queensland environmental offset framework.

3.2 Connectivity Areas

To address cumulative impacts to connectivity, the Landscape Fragmentation and Connectivity (LFC) Tool was run for the study area and treated all existing approved disturbance areas as non-remnant vegetation. The LFC Tool determines the significance of a developments impact on connectivity areas by assessing:

- Whether the change in the core ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale (Test 1); or
- If any core area (greater than or equal to 1 ha) is lost or reduced to patch fragments (core to non core) (DEHP, 2014) (Test 2).

For Test 1, the findings are that the percent change of core at the local scale (post impact) exceeds the local impact threshold indicating a significant impact to connectivity areas at the local scale. For Test 2, the analysis has determined any impact on connectivity areas is not significant.

3.3 Wetlands and Watercourses

Several wetlands that contain regulated vegetation within 100 m of a wetland occur in the ML, but none are located within the study area (**Appendix A7**). There are no wetlands of High Ecological Significance (HES) or springs depicted in current mapping resources for the study area (QLD Globe, 2025). Two HES wetlands occur south and outside of the ML and are not close to the study area (**Appendix A7**). Therefore, there will be no significant residual impacts to these matters through development of the study area.

3.4 Aquatic assessment

Aerial imagery indicates that Hail Creek, and tributaries of Hail Creek, have well-defined channels and irregular meandering plan forms, and no anabranches. Waterways of the Project area are generally dry, comprising dry sandy beds with patches of outcropping sandstone, with Brumby Waterhole and at least one notable refuge pool located on Hail Creek providing intermittent standing water.

Channel width of Hail Creek ranges from 40 - 50 m and bank height from 5 - 6 m, with tributaries of Hail Creek having smaller dimensions. Banks stability of Hail Creek is impacted by slumping. Riparian vegetation is generally continuous along both banks of waterways in the Project area. There are no mapped flood plains in the Project area.

Wetlands of the Project area are shallow, ephemeral and generally in dry condition. They would provide habitat for a range of tolerant emergent aquatic plants and periodic temporary habitat for common aquatic fauna. Most wetlands are near waterways and likely connect with the adjacent waterway in large (overbank) flow events, although a few wetlands south of the Project area are distant from waterways and would likely never connect with waterways and would fill only by rainfall.

Mine water dams are mapped under the Queensland Wetland Mapping layer as lacustrine wetlands; however, these are not considered to be habitat-providing features for aquatic biota.

3.4.1 Streamflow

The flow regime of Bee Creek is ephemeral, with recorded flows being discrete short-duration events (**Figure 2**). Overall, flows are recorded approximately 43 % of the time in Bee Creek (**Figure 3**) with no sustained low flows occurring but sustained periods with zero flow dominating the hydrological regime. Using this historical data, median flow in Bee Creek is zero megalitres a day (ml/day), and maximum was approximately 83,700 ml/day. More recent flow data from another gauge on Bee Creek for a briefer duration indicates flows are recorded approximately 24 % of the time, with median daily flow of zero ml/day and maximum daily flow of approximately 10,000 ml/day (SLR Consulting unpublished data, 2024). As Bee Creek and Hail Creek form a confluence into the same catchment, it is assumed that Hail Creek would follow the same ephemeral flow regime.

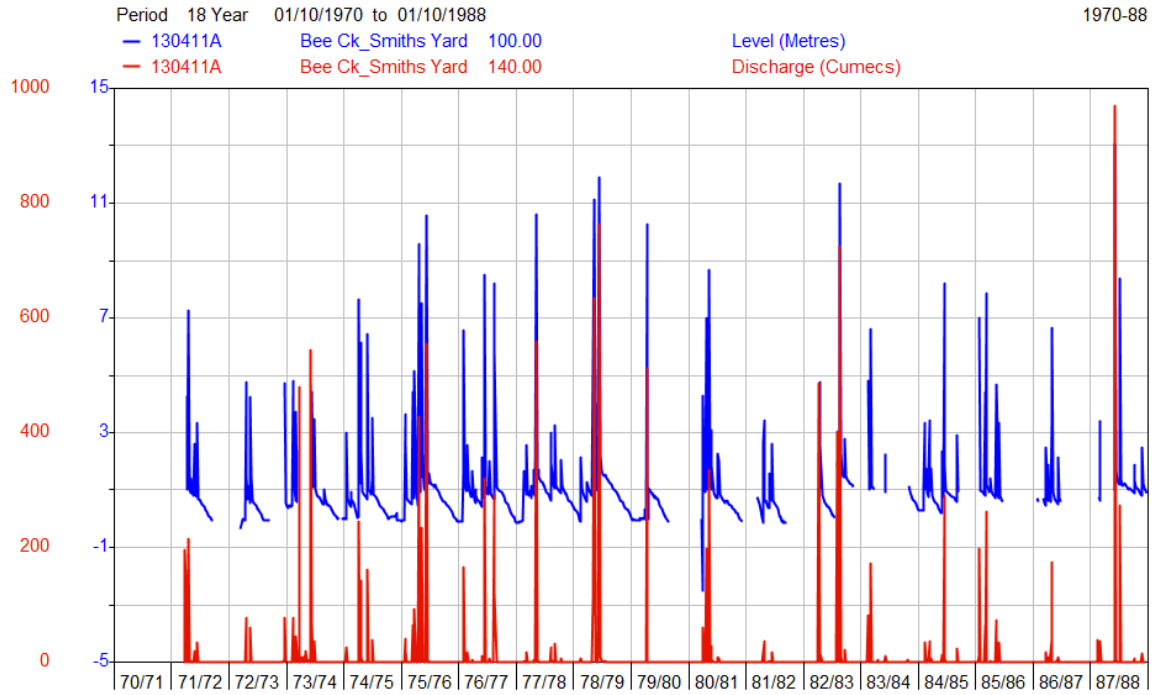


Figure 2 Continuous hydrograph of flows in Bee Creek recorded at gauging station 130411A (Bee Creek at Smith Yard) between October 1970 and October 1988

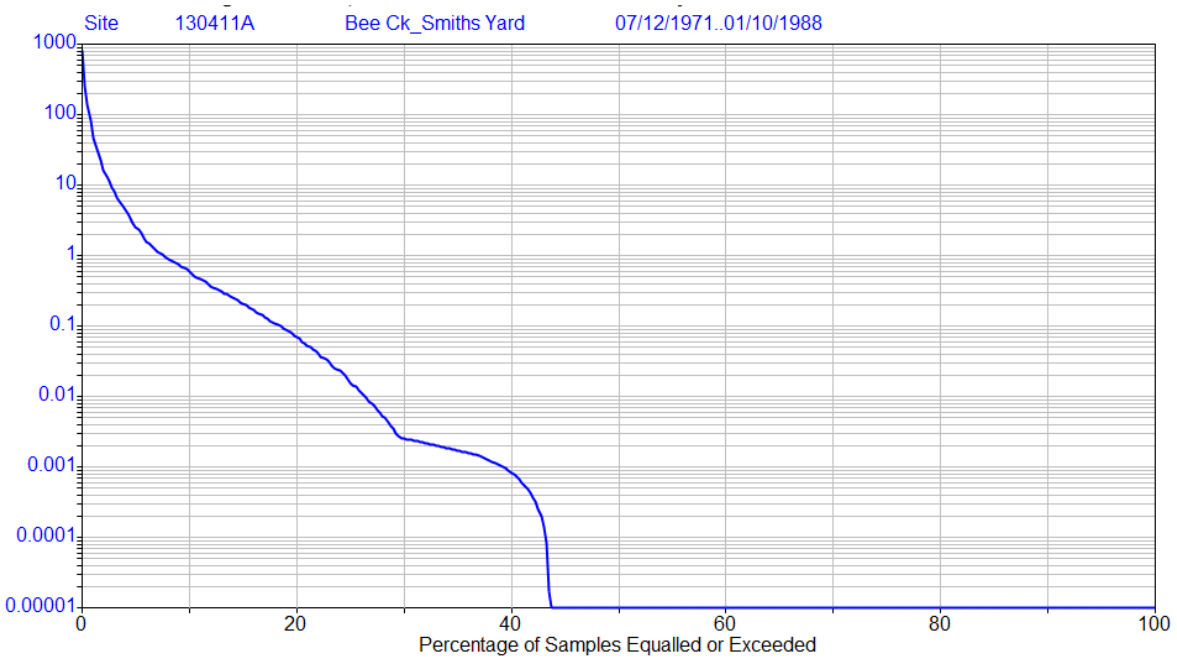


Figure 3 Duration of flows in Bee Creek recorded at gauging station 130411A (Bee Creek at Smith Yard) between December 1971 and October 1988

3.4.2 Waterways that provide fish passage

Hail Creek is mapped as having major (purple) risk of impact to fish passage by waterway barrier works, with tributaries of Hail Creek having high (red), moderate (amber) and low (green) risk of impact to fish passage by waterway barrier works (**Appendix A8**).

Tributaries of Hail Creek within the Project area are mapped as having high (red), moderate (amber) and low (green) risk of impact to fish passage by waterway barrier works (**Appendix A8**).

3.4.3 Turtles

The Protected Matter Search results (**Appendix A1**) indicated that the following aquatic MNES may occur in the Project area:

- White-throated snapping turtle (*Elseya albagula*) (critically endangered); and
- Fitzroy River turtle (*Rheodytes leukops*) (vulnerable).

The white-throated snapping turtle is listed as critically endangered under the EPBC Act and endangered under the NC Act. This species is restricted to the Fitzroy, Burnett and Mary Basins, and adjacent coastal basins (e.g., Kolan and Gregory-Burrum systems) (Todd et al., 2013). Within the Fitzroy River Basin, white-throated snapping turtle occurs from the lower Fitzroy River from the tidal barrage to the Upper Dawson River, Callide Dam, lower Nogoa River, upper Connors River, and lower Isaac River in the Tartrus Weir impoundment (GHD, 2016). This species is a habitat specialist, preferring permanent, flowing, clear and well oxygenated water with moderate to high cover of aquatic habitat (i.e., large woody debris and undercut banks) (Hamann et al., 2007; Limpus et al., 2011a; Limpus et al., 2007; Todd et al., 2013). White-throated snapping turtle generally inhabits deep (i.e., approximately 6 m) pools during the day and shallow riffles at night (Gordos et al., 2007; Hamann et al., 2007), with both of these habitat types absent from waterways of the Project area.

The Fitzroy River turtle is listed as vulnerable under the EPBC Act and vulnerable under the NC Act. This species is endemic to the Fitzroy River basin, with records of the species showing the centre of this species' distribution is the Fitzroy River (main stem) from the tidal barrage to Emerald, the Dawson River and the Connors River (ALA, 2025). Published records of this species indicate that the species occurs from the Fitzroy Barrage to the upper Dawson River, the Mackenzie River and lower reaches of the Nogoa River, and to the Upper Connors River (Cann, 1998; GHD, 2016; Legler & Cann, 1980; Limpus et al., 2011a). Fitzroy River turtle prefers permanent freshwater reaches where there are large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles (Limpus et al., 2011b), but has also been found in isolated permanent waterholes (frc environmental, 2010; Limpus et al., 2007). However, the species is not known to inhabit farm dams or ephemeral waterways (Limpus et al., 2007). Nesting by Fitzroy River turtle occurs in spring (September to November), with hatching occurring in summer (November to March). The upper reaches of the Fitzroy Barrage on the lower Fitzroy River supports the largest known breeding aggregation of Fitzroy River turtles, with the reach of the Mackenzie River downstream of Tartrus Weir and the lower Isaac River in the upper reaches of the Tartrus Weir impoundment also supporting important nesting aggregations (GHD, 2016; Limpus et al. 2011a), although isolated nesting sites occur throughout the range of the species. Predation of nests and hatchlings by mainly feral animals (e.g., pigs, foxes, wild dogs, cats; and trampling of nests by cattle), but also predation by some native species (e.g., goannas, water rats), is the key threatening process, with the population of Fitzroy River turtle now strongly dominated by adults due to long-term lack of recruitment. Water resource development adversely impacts turtles by inundating pool riffle sequences, changing

downstream flow regimes and causing injury and mortality of turtles on spillways; and broad water quality impacts are thought to adversely impact turtle health (GHD, 2016; Limpus et al., 2011a).

The nearest confirmed records of these two species of turtle to the Project area are from the Connors River north of Lotus Creek (ALA, 2025) over 130 km (stream distance) from the Project. The nearest records of these species downstream of these areas are from the upper reaches of Tartrus Weir impoundment (Limpus et al., 2011a), which is over 155 km (stream distance) downstream from the Project Area. There are no records of these species from the Bee Creek sub-catchment or in close proximity to the Project Area (ALA, 2025).

Flow regime has a strong influence on the distribution of these two species in the Fitzroy River basin, given the degree of their specialisation for flow-dominated habitats (Cogger 2000; Todd et al. 2013). Comparison of flow durations at Department of Regional Development, Manufacturing and Water (DRDMW) gauging stations on the Fitzroy River, Dawson River, Connors River and Isaac River (**Table 2**), indicate that Bee Creek has significantly shorter duration of flows compared to flow durations recorded in the Fitzroy River, Dawson River and Connors River from where these two species of turtle are known. Thus, the distribution records that indicate these species do not occur in the Bee Creek sub-catchment or near the Project area align with the reported habitat (i.e., hydrological) preferences of the species (i.e., near-permanent, flow-dominated river reaches).

All waterways within the Project area and surrounds do not provide suitable habitat (i.e., unsuitable flow regime) for white-throated snapping turtle and Fitzroy River turtle; thus, there is low probability of occurrence (i.e., unlikely to occur) of these species in or near the Project area. It is likely that the Connors River at the Funnel Creek confluence is the nearest location that has potentially suitable hydrological characteristics for white-throated snapping turtle and Fitzroy River turtle, with this location being over 105 km downstream of the Project area. It is possible that three common species of turtle (*Chelodina longicolis, C. expansa* and *Emydura macquarii krefftii*) occur periodically in the Project area.

Table 2 Comparison of flow durations (i.e., percentage of time flows are recorded) in the Fitzroy River (main stem), Dawson River, Isaac River and Connors River

State Government Gauging Station	Location	% time flows are recorded
130003B	Fitzroy River at Riverslea	89
130005A	Fitzroy River at The Gap	84
130302A	Dawson River at Taroom	96
130317B	Dawson River at Woodleigh	92
130322A	Dawson River at Beckers	69
130324A	Dawson River at Utopia Downs	100
130374A	Dawson River at Bindaree	72
130403A	Connors River at Mount Bridget	75
130404A	Connors River at Pink Lagoon	81
130401A	Isaac River at Yatton	85
130410A	Isaac River at Deverill	26
130414A	Isaac River at Goonyella	21

State Government Gauging Station	Location	% time flows are recorded
130411A	Bee Creek Smiths Yard	43

3.4.4 Fish

Waterways of the Project Area are temporary and only hold water after significant rain. Thus, fish would only be present in the waterways of the Project area after significant flow events that create hydrological connectivity with downstream refugia pools from which fish could migrate upstream and colonise the otherwise dry waterways. The fish species that would be present during wet conditions would have well-developed abilities for dispersal to capitalise on periodic and brief flow events and would be tolerant of water quality with often high electrical conductivity, high turbidity and low dissolved oxygen. None of the fish species known or likely to occur in the Project area are listed threatened species under the EPBC Act or NC Act.

While some 53 native species of fish are known from freshwater reaches of the Fitzroy River Basin (DES, 2024b), database searches (ALA, 2025; DES, 2024a) and previous surveys from the Bee Creek catchment (SLR Consulting unpublished data) indicate that ten native fish species have been confirmed Bee Creek catchment, which encompasses Hail Creek:

- Agassizi's glassfish (*Ambassis agassizii*);
- Blue catfish (*Neoarius graeffei*);
- Eastern rainbowfish (*Melanotaenia splendida splendida*);
- Fly-specked hardyhead (*Craterocephalus stercusmuscarum);*
- Spangled perch (*Leiopotherapon unicolor*);
- Bony bream (*Nematalosa erebi*);
- Southern purple spotted gudgeon (*Mogurnda adspersa*);
- Common gudgeons (*Hypseleotris* spp.);
- Sleepy cod (*Oxyeleotris lineolata*); and
- Hyrtl's tandan (*Neosilurus hyrtlii*).

These are all common species that are tolerant of harsh environmental conditions (e.g., variable flow, fluctuating water quality) that are typical of ephemeral watercourses of the region (Pusey et al., 2004). All species are potadromous (i.e., they migrate to various extents within freshwaters), with the exception of longfin eel which is diadromous (i.e., migrates between freshwaters and marine waters). None of these species have commercial or recreational fisheries value, except sleep cod which has limited interest by recreational fishers.

The three species of fish that are endemic to the Fitzroy River Basin (i.e., Leathery grunter (*Scortum hillii*), southern saratoga (*Scleropages leichardti*) and the genetic population of golden perch from the Fitzroy River (*Macquaria ambigua*)) are not known from the Bee Creek catchment.

3.4.5 Macroinvertebrates

Previous surveys of aquatic macroinvertebrates in the Bee Creek catchment, which encompasses the Project area, indicate that aquatic insects dominate macroinvertebrate

communities (frc environmental, unpublished data, **Table 3**). Other macroinvertebrate taxa that have commonly been recorded from the Bee Creek catchment (frc environmental, unpublished data) include: arachnids, molluscs, decapod crustaceans (prawns and freshwater crabs), microcrustaceans and segmented worms.

The available data for macroinvertebrate taxonomic richness, PET (Plecoptera/ Ephemeroptera/ Trichoptera) richness, Stream Invertebrate Grade Number Average Level version 2 (SIGNAL-2) Score and percent tolerant taxa indicated that the macroinvertebrate communities of waterways of the Bee Creek catchment are more impoverished than expected by the default biological objectives (SLR Consulting unpublished data). In some cases, these results may reflect the short period of time over which sites were holding water prior to sampling; thus, there was insufficient time to allow colonisation of isolated pools by a greater number of taxa and thus attain a 'mature' macroinvertebrate community. However, the overall quality of aquatic habitat for macroinvertebrates in waterways of the Bee Creek catchment is low (SLR Consulting unpublished data); thus, even 'mature' communities would likely have low diversity and few sensitive macroinvertebrate taxa.

None of the macroinvertebrate taxa known or likely to occur in the Project area are listed threatened species under the EPBC Act or NC Act.

Table 3 Aquatic insects recorded from Bee Creek catchment

Order	Families
Coleoptera (beetles)	*Curculionidae, Dytiscidae, Gyrinidae, Haliplidae, Heteroceridae, Hydraenidae, Hydrochidae, Hydrophilidae, Nanophyidae, Noteridae, Scirtidae, Spercheidae, Staphylinidae*
Diptera (flies)	*Ceratopogonidae, Chaoboridae, s-f Chironominae, Culicidae, Dolichopodidae, Empididae, Ephydridae, Muscidae, s-f Orthocladiinae, Simuliidae, Stratiomyidae, Tabanidae, s-f Tanypodinae, Tipulidae*
Ephemeroptera (mayflies)	*Baetidae, Caenidae, Leptophlebiidae*
Hemiptera (true bugs)	*Corixidae, Gelastocoridae, Gerridae, Hydrometridae, Mesoveliidae, Micronectidae, Nepidae, Notonectidae, Ochteridae, Pleidae, Veliidae*
Odonata (dragonflies and damselflies)	*Aeshnidae, Coenagrionidae, Corduliidae, Gomphidae, Isostictidae, Libellulidae, Lindeniidae, S.O. Epiproctiphora, S.O. Zygoptera*
Trichoptera (caddisflies)	*Ecnomidae, Hydroptilidae, Leptoceridae*
Lepidoptera (butterflies)	*Crambidae*

3.4.6 Aquatic Plants

Aquatic plant communities of the region are typically species-poor and have low per cent cover, which is likely due to the short duration of flows in ephemeral watercourses resulting in unsuitable habitat for many aquatic plant species (Van Manen, 2005). Furthermore, at those sites in the wider region where more perennial water was present, submerged aquatic plants were uncommon due to high turbidity, with emergent taxa dominating aquatic plant communities at these sites, including smartweeds (*Persicaria* spp.), rushes (*Eleocharis* spp.) and sedges (*Cyperus* spp.). Swamp lily (*Ottelia ovalifolia*), a floating attached species, was the most common aquatic plant not of an emergent growth form in the region.

Database searches and previous surveys of aquatic plants in the Bee Creek catchment (SLR Consulting unpublished data, **Table 4**) indicate that aquatic plants are dominated by species with an emergent growth form that often grow on dry bed or banks. None of the recorded aquatic plant species are listed as threatened species under Queensland's NC Act. There are no records of aquatic weeds, including those species that are biosecurity matters, from the Bee Creek catchment (ALA, 2025; DETSI, 2024b).

At the scale of the Fitzroy River Basin, 316 wetland indicator plant species are known, of which 144 are rare or threatened (DES, 2024b). Thus, compared to the wider Fitzroy River Basin, the approximately 35 common aquatic plant species recorded from the Bee Creek catchment indicates a low diversity of aquatic plants, with none of the rare or threatened species that occur elsewhere in the basin occurring in the Bee Creek catchment.

Table 4 Aquatic Plant Species Recorded from the Bee Creek Catchment

Common name	Species	Growth Form
Sedges	*Cyperus esculentus, C. exaltatus, C. cristulatus, C. alopecuroides, C. polystachyos, C. difformis, C. squarrosus, C. scariosus; Fimbristylis nutans, F. microcarya, F. nuda*	emergent
Common rush	*Juncus usitatus*	emergent
Toad rush	*Juncus bufonius*	emergent
–	*Caldesia oligococca*	emergent
False daisy	*Eclipta prostrata*	emergent
Sundew	*Drosera* spp.	emergent
Water wort	*Elatine gratioloides*	emergent
–	*Lythrum paradoxum*	emergent
Mat rush	*Lomandra* sp.	emergent
Willow primrose	*Ludwigia octovalvis*	emergent
Water primrose	*Ludwigia peploides*	emergent
Hydrophilic grasses	*Walwhalleya subxerophila, Diplachne fusca var. fusca, Echinochloa colona, Panicum larcomianum*	emergent
Knotweeds	*Persicaria orientalis, P. attenuata*	emergent
Water milfoil	*Myriophyllum verrucosum*	submerged
Water nymph	*Najas tenuifolia*	submerged
Swamp lily	*Ottelia ovalifolia*	floating attached
Blue water lily	*Nymphaea violacea*	floating attached
River she-oak	*Casuarina cunninghamiana subsp. Cunninghamiana*	riparian tree
River red gum	*Eucalyptus camaldulensis subsp. acuta*	riparian tree
Paperbarks / tea-trees / bottlebrush	*Melaleuca bracteata, M. viminalis, M. fluviatilis. M. leucadendra, M. linariifolia*	riparian tree

3.5 Protected Wildlife Habitat

The PMST desktop searches by EcoSM (2015) returned 24 threatened species and 13 migratory species. Following field assessments, most of these have been assessed as unlikely to occur within HCOC by EcoSM (2015), including Masked Owl (northern) (*Tyto novaehollandiae kimberli*) despite targeted surveys including call playback for this species. However, several of these species were either determined to occur within HCOC during baseline assessments by EcoSM (2015), and/or HCOC contained habitat values for these species. Those relevant conservation significant species or their habitat that have been recorded, or are likely present, within the study area are presented in **Table 5** and shown in maps in **Appendix A5** and **Appendix A9** to **Appendix A12**. The Southern and Central Greater Glider was recorded by EcoSM in their field assessments however, this species was not listed at the time of the survey.

Table 5 Conservation significant species, and/or their habitat, identified to occur within the study area

Status		Family	Scientific Name	Common Name	Present at HCOC
NC Act[1]	EPBC Act				
Flora					
LC	V	Myrtaceae	*Eucalyptus raveretiana*	Black Ironbox	Yes
Birds					
V	V	Apodidae	*Hirundapus caudacutus*	White-throated Needletail	Yes
V	-	Cacatuidae	*Calyptorhynchus lathami erebus*	Glossy Black-Cockatoo	No
V	V	Columbidae	*Geophaps scripta scripta*	Squatter Pigeon (Southern)	Yes
Mammals					
E	E	Phascolarctidae	*Phascolarctos cinereus*	Koala	Yes
E	E	Pseudocheiridae	*Petauroides volans (armillatus)*	Southern and Central Greater Glider	Yes
SLC	-	Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	Yes
Reptiles					
V	V	Elapidae	*Denisonia maculata*	Ornamental Snake	Yes

1. NC Act equates to the *Nature Conservation Act 1992*

NC Act and EPBC Act status legend: E= Endangered, V= Vulnerable, SLC=Special Least Concern, LC=Least Concern

Note: The status of the White-throated Needletail, Koala and Southern and Central Greater Glider have changed since the development of the EcoSM (2015) report. Therefore, significant impacts to these species in association with potential impacts from the HCOC may not have been previously assessed.

Current database searches (PMST and WO) and field assessments were conducted to contemporise previous data and assessments. The PMST search returned a total of 36 threatened species, including 11 species not previously identified in the EcoSM (2015) desktop assessment. Those species identified via the current database searches (DCCEEW, 2024, **Appendix A1**) and not previously returned within the EcoSM (2015) desktop assessment, are shown in **Table 6** and their likelihood of occurrence is assessed. Of the 11 new species identified, all were considered to have a low likelihood of occurrence within the study area due to no records occurring within 10 km of the study area or their habitat requirements not occurring in the study area.

Table 6 Additional conservation significant species, and/or their habitat, identified during current desktop and field assessments

Status		Family	Scientific Name	Common Name	Likelihood of occurrence in the study area
NC Act[1]	EPBC Act				
Flora					
E	E	Solanaceae	*Solanum graniticum*	Granite Nightshade	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. The closest record occurs approximately 30 km north of HCOC associated with Eungella dam. This species grows in open eucalypt woodland on hillsides with shallow soil derived from granite or granodiorite. Associated species include *Eucalyptus drepanophylla* and *Corymbia erythrophloia.* This is a distinctive Solanum that was not located during previous and current field assessments. Habitat requirements for this species do not occur within the study area. This species is unlikely to inhabit the study area.
V	V	Simaroubaceae	*Samadera bidwillii*	Quassia	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. The majority of records for this species occur around Rockhampton and Shoalwater Bay. This species commonly occurs in lowland rainforest often with *Araucaria cunninghamii* or on rainforest margins, but it can also be found in open forest and woodland, it is commonly found in areas adjacent to both temporary and permanent watercourses up to 510 m altitude. Commonly associated trees in the open forest and woodlands include spotted gum (*Corymbia citriodora*), grey gum (*Eucalyptus propinqua*), white mahogany (*E. acmenoides*), forest red gum (*E. tereticornis*), pink bloodwood (*Corymbia intermedia*), ironbark (*E. siderophloia*), gum topped box (*E. moluccana*), Gympie messmate (*E. cloeziana*) and broad- leaved ironbark (*E. fibrosa*) (DETSI, 2024a). Habitat requirements for this species do not occur within the study area. This species is unlikely to inhabit the study area.
V	V	Lycopodiaceae	*Phlegmariurus tetrastichoides*	Square Tassel Fern	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. The closest record of this species occurs approximately 21 km to the northeast situated in Crediton State Forest. This species grows high in the canopy of trees in complex vine forest and rainforest, over granite, basalt and other metamorphics to an altitude of 1,100 m above sea level. It occurs in habitat along creeks and on slopes

Status		Family	Scientific Name	Common Name	Likelihood of occurrence in the study area
NC Act[1]	EPBC Act				
					and has not been recorded from coastal flats. Habitat requirements for this species do not occur within the study area. This species is unlikely to inhabit the study area.
V	V	Rhamnaceae	*Polianthion minutiflorum*	-	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. The closest record of this species occurs approximately 34 km northwest of HCOC associated with Redcliffe Vale NRS addition. This species is found in forest and woodland on sandstone slopes and gullies with skeletal soil, or sometimes deeper sands adjacent to deeply weathered laterite. Associated species and vegetation includes: open woodland of *Acacia shirleyi, Lysicarpus angustifolius, Corymbia aureola*; woodland of *Eucalyptus corynodes, Corymbia trachyphloia, E. cloeziana* on sandy soil over sandstone.; sandstone plateau with *Eucalyptus dura, E. fibrosa, Angophora leiocarpa, E. major* (DETSI, 2024a). Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.
V	V	Poaceae	*Arthraxon hispidus*	Hairy-joint Grass	Low – There are no records of the species within 10 km of the study area on WO and ALA searches. The closest record of this species is over 300 km west of the study area. This species prefers habitat of wet eucalypt forest, often near creeks and swaps, as well as freshwater springs on coastal foreshore dunes, in shaded small gullies, on creek banks, and on sandy alluvium in creek beds in open forests (DES, 2024). Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.
V	V	Asteraceae	*Ozothamnus eriocephalus*	-	Low – There are no records of the species within 10 km of the study area on WO and ALA searches. However, there are two records approximately 15 and 18 km west of the study area, and an additional 11 records between 20 and 50 km from the study area. This species prefers a range of habitat types, including margins of notophyll vine forest, margins of gallery forest, microphyll vine forest, tall open eucalypt forests. It may also inhabit the edges of creek banks, crevices on steep granite slopes, often in sunny situations. It occurs on skeletal sandy or gravelly soils or occasionally deeper red-brown clay loams derived from granites and sandstones. Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.

Status		Family	Scientific Name	Common Name	Likelihood of occurrence in the study area
NC Act[1]	EPBC Act				
E	E	Orchidaceae	*Phalaenopsis rosenstromii* listed as *Phalaenopsis amabilis subsp. rosenstromii*	Native Moth Orchid	Low – There are no records of the species within 10 km of the study area on WO and ALA searches. The closest record of this species is approximately 31 km east of the study area. This species prefers sheltered slopes and gullies, in deep gorges and close to waterfalls and streams (ANBG, 2016). Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.
Birds					
V	V	Estrildidae	*Stagonopleura guttata*	Diamond Firetail	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. This species occurs south of Rockhampton with few records north of this. The closest record to HCOC is approximately 89 km to the east. This species occurs in eucalypt, *Acacia* or *Casuarina* woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees (DCCEEW, 2023). They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover. Due to few records of this species north or Rockhampton, this species is considered unlikely to inhabit the study area.
V	V	Falconidae	*Falco hypoleucos*	Grey Falcon	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. This species favours *Acacia* shrublands that are crossed by tree-lined watercourses. The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread, although it is essentially confined to the arid and semi-arid zones at all times. This species is considered unlikely to inhabit the study area.
E	E	Rostratulidae	*Rostratula australis*	Australian Painted Snipe	Low – EcoSM conducted searches incorporating 270 person hours for this species in 2015 and one individual was detected south of the study area. Except the single observation in 2015, there are no records of this species within 10 km of the study area on WO. The closest recorded on ALA is approximately 54 km to the southwest. 75 ha of high value habitat for this species was mapped in the Hail Creek ML incorporating RE's 11.3.2b, 11.3.21 and 11.3.27 that equate to types of permanent wetlands. None of the mapped habitat in 2015 occurs in the current study area. Additional surveys by SLR were conducted in November 2022 and March 2023 and no additional areas of habitat

Status		Family	Scientific Name	Common Name	Likelihood of occurrence in the study area
NC Act[1]	EPBC Act				
					were identified and no Australian Painted Snipe were observed. The study area consists of slightly undulating terrain dominated by eucalypt and *Corymbia* species with a few drainage features and watercourses. This species prefers wetlands, swamps and temporary and permanent lakes with emergent tussocks of grass, sedges, rushes or reeds (DCCEEW, 2013). No preferred habitat or wetland habitats were recorded in the study area. As multiple surveys did not record this species or its habitat in the study area, it is unlikely that this species occurs in the study area.
CE	CE	Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. All records in the local area are situated in coastal areas. This species mainly occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. Habitat for this species does not occur in the study area. This species is considered unlikely to inhabit the study area.
V	V	Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. However, there are two records of this species approximately 13 km to the west of HCOC associated with lake Elphinstone. This species utilises fresh and hypersaline environments, feeding along the edge of water on mudflats, coastal and inland wetlands, and sewage ponds. Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.
Mammals					
V	V	Pseudocheiridae	*Petaurus australis australis*	Yellow-bellied Gider (south-eastern)	Low – There are no records of this species within 10 km of the study area on WO and ALA searches. The closest record of this species is approximately 25 km north-east of the Project area, and an additional five records between 30 and 50 km north-east from the study area. This species prefers tall, mature eucalypt forests, with the presence of two eucalypt species, *Eucalyptus resinifera* and *Eucalyptus grandis*, is essential (Quin *et al*. 1996). Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.

Status		Family	Scientific Name	Common Name	Likelihood of occurrence in the study area
NC Act[1]	EPBC Act				
Reptiles					
E	E	Chelidae	*Rheodytes leukops*	Fitzroy River turtle	Low– There are no records of this species within 10 km of the study area on WO and ALA searches. The closest record of this species is approximately 130 km north of the Project area. This species prefers permanent freshwater reaches where there are large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles (Limpus et al. 2011b), but has also been found in isolated permanent waterholes (Limpus et al. 2007). Habitat requirements for this species do not occur within the study area. This species is considered unlikely to inhabit the study area.
CE	CE	Chelidae	*Elseya albagula*	White-throated snapping turtle	Low– There are no records of this species within 10 km of the study area on WO and ALA searches. The closest record of this species is approximately 130 km north of the Project area. This species is a habitat specialist, preferring permanent, flowing, clear and well oxygenated water with moderate to high cover of aquatic habitat (i.e., large woody debris and undercut banks) (Hamann et al. 2007; Limpus et al. 2011a; Limpus et al. 2007; Todd et al. 2013). White-throated snapping turtle generally inhabits deep (i.e., approximately 6 m) pools during the day and shallow riffles at night (Gordos et al. 2007; Hamann et al. 2007), with both of these habitat types absent from waterways of the Project area.

Status listing legend: CE= Critically endangered, E= Endangered, V= Vulnerable.

Within the study area, habitat for Koala (*Phascolarctos cinereus*) (**Appendix A9**), Squatter Pigeon (Southern) (**Appendix A9**), Glossy Black-Cockatoo (*Calyptorhynchus lathami erebus*) (**Appendix A10**), Black Ironbox (**Appendix A11**) and Short-beaked Echidna (*Tachyglossus aculeatus*) were mapped by EcoSM (2015) and verified by SLR. It should be noted that the Southern and Central Greater Glider was not a listed species at the time of the EcoSM (2015) survey. However, this species was recorded in REs 11.3.2, 11.3.4, and 11.3.25/a within the HCOC ML during EcoSM's assessments and due to the species habitat requirements of mature trees with hollows in more moist forests, these REs have been used to map its habitat within the study area (**Appendix A12**). Habitat for Ornamental Snake was also mapped by EcoSM (2015); however, their mapping occurs outside of the study area. Black Ironbox and its habitat was ground-truthed within portions of RE 11.3.25a. Additional habitat for this species was ground-truthed by SLR in March 2023 within RE 11.3.25a in Area 1 (see maps in **Appendix A5**).

Within the study area, habitat for threatened fauna species is mapped as follows:

- Areas 1, 2 and 3 – contains habitat for Short-beaked Echidna, Glossy Black-Cockatoo Koala, Squatter Pigeon (Southern), Black Ironbox and Southern and Central Greater Glider; and
- Area 4 – contains habitat for Short-beaked Echidna, Koala, Squatter Pigeon (Southern) and Southern and Central Greater Glider.

Combined, habitat mapping by EcoSM (2015) and SLR (2025), and essential habitat mapping (**Section 4.1**), are considered conservation significant species' habitat and are assessed for significant impacts in this report.

The Australian Painted Snipe (*Rostratula australis*) has been recorded previously at HCOC and habitat for this species was mapped by EcoSM (2015). EcoSM conducted searches incorporating 270 person hours for this species in 2015 and one individual was detected south of the study area. 75 ha of high value habitat for this species was mapped in the Hail Creek ML incorporating RE 11.3.2b, 11.3.21 and 11.3.27 that equate to types of permanent wetlands (see **Figure 4**). None of the mapped habitats (RE's) described in 2015 occur in the current study area. The closest area of high value habitat occurs approximately 900 m to the southwest of Area 4. Additional surveys by SLR were conducted in November 2022 and March 2023 in the new study area with no additional areas of habitat identified and no Australian Painted Snipe were observed. The existing study area consists of slightly undulating terrain dominated by eucalypt and *Corymbia* species with a few drainage features and watercourses. This species prefers shallow terrestrial freshwater (occasionally brackish) wetlands, swamps and temporary and permanent lakes with emergent tussocks of grass, sedges, rushes or reeds (DCCEEW, 2021). No preferred habitat were recorded in the current study area and therefore, no direct impacts will occur to this species or its habitat. Indirect impact pathways such as the of degradation of water quality entering the nearby wetland that is mapped as Australian Painted Snipe habitat are unlikely. The catchment area which is directly hydrologically linked to the nearby wetland habitat does not occur in the current study area and hence, will not be influenced by development of the study area. As it is highly unlikely that there will be any direct or indirect impacts to Australian Painted Snipe from the project, it has been excluded from impact assessment.

HAIL CREEK

MAJOR EA AMENDMENT

CONSERVATION SIGNIFICANT FAUNA HABITAT

LEGEND

- Major Watercourse
- Mining Lease
- Study Area

Conservation Significant Fauna Species

- Australia Painted Snipe *(Rostratula australis)*

Potential Habitat

- High Value Habitat- Australia Painted Snipe *(Rostratula australis)*

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	19-Mar-2025
Drawn by:	AS

SLR

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Numerous migratory species and/or their habitat were also identified by EcoSM (2015) to occur within HCOC. It was considered that HCOC was unlikely to provide important habitat for these species and that development within the Hail Creek Transition Project was unlikely to result in a significant impact to migratory species. These results remain valid as no habitat for migratory species was previously mapped within the study area and current field assessments in November 2022 and March 2023 also did not record any habitat for migratory fauna. It is unlikely that the study area contains important habitat for any migratory species and that development within the study area would impact on an ecologically significant proportion of the population of a migratory species. Therefore, migratory species have been excluded from impact assessments.

Conservation significant species presented in **Table 5** and their habitat are a prescribed environmental matter and a significant residual impact to this matter may incur offset liability as per the Queensland environmental offset framework. Impact assessments specific to each species and their habitat are detailed in **Section 4.3**.

3.6 Protected Areas

Homevale National Park (HNP) is located immediately east of the study area (QLD Globe, 2023). Under Section 8(2) of the *Environmental Offsets Act 2014*, an impact on a protected area is significant if a prescribed activity results, or will or is likely to result, in one or more of the following:

- The authorised clearing or inundation of all or part of the protected area for the construction of private or publicly owned infrastructure on the area;
- The exclusion of, or reduction in, the public use or enjoyment of all or part of the protected area; or
- A reduction in the natural or cultural values of all or part of the protected area.

Significant impact assessments to HNP due to development within HCOC are discussed at length in EcoSM (2015). Overall, it was determined by EcoSM (2015) that there will be no direct impacts to protected areas due to the previous development within HCOC. Additionally, it was determined that the residual indirect impacts of development of HCOC are unlikely to extend far (approximately 30 m) into the protected area where development bordered the National Park. The current study area does not border HNP, with the closest area (Area 3) located over 1.8 km away. As no direct or indirect impacts will occur to HNP, it is unlike that development will degrade vegetation and habitat to the extent that natural or cultural values will be substantially reduced or compromised. A full description of potential indirect impacts to HNP due to the previous development within HCOC that bordered HNP and a significant impact assessment for these indirect impacts is provided within EcoSM (2015). Overall, it is considered that these prior assessments remain relevant to addressing the likelihood of significant impacts to the HNP from development of the study area. Therefore, it is considered that no additional assessment is required.

3.7 Threatened Ecological Communities

REs corresponding to three TECs were ground-truthed to occur within HCOC during previous ecological assessments by EcoSM (2015), which are described in **Table 7**. These TECs correspond to those returned within the PMST report, with the exception of the Poplar Box Grassy Woodland on Alluvial Plains TEC, which was not identified during EcoSM or SLR field assessments within the study area.



Table 7 TECs ground-truthed to occur within HCOC

Description	Status
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered
Natural grasslands of the Queensland central highlands and northern Fitzroy Basin	Endangered
SEVTs of the Brigalow Belt (north and south) and Nandewar bioregions	Endangered

Two of these TECs occur within the study area (**Appendix A13**). The Brigalow TEC and SEVTs of the Brigalow Belt TEC, occurring within Area 4. Two polygons of RE 11.9.4 occur in Area 4 and equate to the SEVTs of the Brigalow Belt TEC and one polygon of RE 11.9.5 also occurs in Area 4 which equates to the Brigalow TEC. Significant impacts to these communities may require approval under the EPBC Act.

4.0 Impact Assessment

4.1 Matters of State Environmental Significance

4.1.1 Regulated Vegetation

Clearing of REs with an 'Of concern' or 'Endangered' VM Act status that exceed relevant thresholds outlined within the *Queensland Environmental Offset Policy Significant Residual Impact Guideline* (DEHP, 2014) is a significant residual impact to this prescribed environmental matter. In such case, the provision of an environmental offset may be required under the Queensland environmental offset framework. These relevant thresholds for State-mapped and ground-truthed regulated vegetation within the study area by EcoSM (2015) are detailed below.

A significant residual impact will occur to 'Of concern' REs with a sparse structural category within the study area if:

- Clearing for linear infrastructure is greater than 20 m wide; or
- Clearing for other than linear infrastructure is greater than 2 ha.

A significant residual impact will occur to 'Of concern' or 'Endangered' REs with a dense to mid-dense structural category within the study area if:

- Clearing for linear infrastructure is greater than 10 m wide; or
- Clearing for other than linear infrastructure is greater than 0.5 ha.

The provision of an environmental offset will be required under the Queensland environmental offsets framework for those REs with an 'Of concern' or 'Endangered' VM Act class in **Table 1** if the Project cannot avoid clearing greater than the limits listed above.

4.1.2 Remnant Vegetation Associated with a Watercourse

There are several watercourse and drainage features relevant to the study area that are represented on the *Vegetation Management Watercourse and Drainage Feature Map* (**Appendix A6**). The defined distance (or extent to which the remnant vegetation associated with the watercourse is considered a prescribed environmental matter) is determined by the bioregional context and the stream order of the watercourse or drainage feature.

The majority of the vegetation communities located within the study area are classified as remnant REs and therefore the extent of all mapped vegetation communities within the defined distance of the banks of the State-mapped watercourse or drainage features is a prescribed environmental matter (**Appendix A6**). HCOC is located within a non-coastal bioregion and the relevant defining distances for REs associated with a watercourse are shown in **Table 8**.

Table 8 Defined distance for REs associated with a watercourse (non-coastal bioregions) as shown in the Queensland Environmental Offsets Policy V1.13

Stream order	Defined distance (m)
1 or 2	25
3 or 4	50

Significant residual impacts to this prescribed environmental matter are determine by the following criteria:

- Clearing occurs within 5 m of the defining bank of the feature; and
- The following area thresholds are exceeded:
  - Clearing for linear infrastructure within a sparse structural category RE is greater than 20 m wide; or
  - Clearing for other than linear infrastructure within a sparse structural category RE is greater than 2 ha; or
  - Clearing for linear infrastructure within a dense to mid-dense structural category RE is greater than 10 m wide; or
  - Clearing for other than linear infrastructure within a dense to mid-dense structural category RE is greater than 0.5 ha.

If clearing of remnant vegetation is greater than the criteria listed above, there will be significant residual impact to this prescribed environmental matter. The provision of an environmental offset will be required under the Queensland environmental offsets farmwork.

There are a few areas where there are opportunities for small design modifications to reduce offset liability or avoid impacts to that matter within a particular zone altogether. There is a small area of remnant vegetation associated with a watercourse in each polygon of Area 1 Amending the study area to avoid impacts to these areas will retain this prescribed environmental matter in Area 1.

The southeast border of Area 2 and western border of Area 3 both intercept areas of remnant vegetation associated with a watercourse Amending the design to exclude these areas will reduce the offset liability for this prescribed environmental matter.

4.1.3 Essential Habitat

Essential habitat for Ornamental Snake, Squatter Pigeon (Southern) and Southern and Central Greater Glider is State-mapped and ground-truthed within the study area. The clearing of essential habitat for these species is a prescribed environmental matter and was assessed against the *Queensland Environmental Offsets Policy – Significant Residual Impact Guidelines* (DEHP, 2014).

Impacts and the determination if offsets are required to conservation significant species and their habitat is discussed in **Section 4.3**.

4.1.4 Protected Wildlife Habitat

Within the study area, ground-truthed habitat is mapped for Squatter Pigeon (Southern), Koala, Southern and Central Greater Glider, Ornamental Snake, Glossy Black-Cockatoo and Short-beaked Echidna (see maps in **Appendix A5**, and **Appendix A9** to **Appendix A12**).

An area of habitat (foraging, roosting, nesting or breeding habitat) for an animal that is endangered, vulnerable or a special least concern animal is a prescribed environmental matter. The provision of an environmental offset will be required under the Queensland environmental offsets framework for a significant residual impact to this prescribed environmental matter.

Impact assessment and the determination of offsets requirements for this matter are discussed in **Section 4.3**.

4.1.5 Connectivity

A significant residual impact to connectivity from the Project was identified for Test 1 using the LFC Tool. A significant residual impact for connectivity is defined as the outcome of

either or both of the two tests is true. This confirms a significant residual impact to connectivity on the local scale and environmental offsets for this prescribed environmental matter will be required.

4.1.6 Waterways that Provide Fish Passage

Hail Creek is mapped as having major (purple) risk of impact to fish passage by waterway barrier works, with tributaries of Hail Creek having high (red), moderate (amber) and low (green) risk of impact to fish passage by waterway barrier works (**Appendix A8**). Tributaries of Hail Creek within the Project area are mapped as having high (red), moderate (amber) and low (green) risk of impact to fish passage by waterway barrier works (**Appendix A8**).

Hail Creek has moderate aquatic ecological values because it is a major corridor for fish migration at times it has flows and has temporary pools that provide refuge habitat for intermittent periods. These ecological functions would be for a relatively limited diversity of common and widespread species.

4.2 Matters of National Environmental Significance

4.2.1 Threatened Ecological Communities

Two TECs were ground-truthed within the study area. Three polygons of RE 11.9.4 occur in Area 4 and equate to the SEVTs of the Brigalow Belt TEC and one polygon of RE 11.9.5 also occurs in Area 4 which equates to the Brigalow TEC.

Under the EPBC Act MNES significant impact guidelines 1.1 (DEWHA, 2013), an action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water draining patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - Assisting invasive species, that are harmful to the listed ecological community, to become established; or
    - Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community, which kill or inhibit the growth of species in the ecological community.
- Interfere with the recovery of an ecological community.

Assessment for significant impacts to the SEVTs of the Brigalow Belt TEC can be found in **Table 9** and assessment for significant impact to the Brigalow TEC can be found in **Table 10**.

Table 9 MNES significant impact assessment for SEVTs of the Brigalow Belt TEC

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
Reduce the extent of an ecological community.	The Project impacts upon three polygons of RE 11.9.4 to varying amounts. As the study area is not on the edge of the ecological community's distribution, clearing areas of RE 11.9.4 is unlikely to reduce the extent of this ecological community. If disturbance to these polygons cannot be avoided by design, the overall area of this TEC within the study area will be reduced which will adversely affect habitat critical to the survival of the ecological community, however, no fragmentation to this ecological community will occur. If the design to Area 4 was amended to avoid two of the three polygons of RE 11.9.4, any potential land-based offset for this TEC will likely be greatly reduced.
Fragment or increase fragmentation of an ecological community.	
Adversely affect habitat critical to the survival of an ecological community.	
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	It is unlikely that abiotic factors that are necessary for the ecological community's survival will be modified or destroyed for those areas of this TEC that are retained.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species.	It is unlikely that the retained areas of this TEC will have a substantial change in the species composition to an extent that there is a decline, or a loss of a functionally important species occurs. Clearing portions of this TEC has the potential to cause a change in species composition of the retained areas due to the increased likelihood of invasive species colonising the area. Ensuring all machinery brought to site is clean and free of weed species will reduce the likelihood of invasive species colonising the retained areas.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established; or • Causing regular mobilisation of fertilisers, herbicides or other chemical or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	
Interfere with the recovery of an ecological community.	Although the design impacts upon this TEC, the polygons are small in size and are unlikely to contribute to the specified objectives for the recovery of this TEC including: • Identify and evaluate the extent, biodiversity value and condition of remnant and regrowth areas of SEVTs of the Brigalow Belt TEC in the brigalow Belt (North and South) and Nandewar Bioregions; • Establish a comprehensive, adequate and representative system of SEVTs of the Brigalow Belt TEC areas across the Brigalow Belt (North and South) and Nandewar

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
	Bioregions, protected either by reservation or conservation agreements; • Ensure 'best-practice' management is applied to sites containing the SEVTs of the Brigalow Belt TEC; and • Encourage involvement of landholders and the community in the conservation and management of the SEVTs of the Brigalow Belt TEC. Impacts to these three polygons of this TEC is unlikely to interfere with the recovery of the ecological community.
Conclusion	**Overall, if clearing of polygons of RE 11.9.4 cannot be avoided, there will be a significant impact to this TEC.**

Table 10 MNES significant impact assessment for Brigalow TEC

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
Reduce the extent of an ecological community.	The project directly impacts upon a small portion (approximately 0.3 ha) of Brigalow TEC (RE 11.9.5). It is unlikely that the small amount of impact would reduce the extent of the ecological community or fragment the community as the majority (approximately 2.1 ha) will be retained.
Fragment or increase fragmentation of an ecological community.	
Adversely affect habitat critical to the survival of an ecological community.	The study area marginally intercepts upon RE 11.9.5. The small amount of impact to the edges of this ecological community is unlikely to affect habitat critical to the survival of the ecological community or modify or destroy any abiotic factors necessary for the survival of the ecological community.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species.	Species richness within the Brigalow TEC is low and the small reduction in size is unlikely to alter the species composition of the ecological community.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established; or • Causin regular mobilisation of fertilisers, herbicides or other chemical or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	Clearing a small portion of RE 11.9.5 has the potential to cause a change in species composition to the Brigalow TEC due to the introduction of invasive flora species. Clearing within and adjacent to the TEC can increase the likelihood of invasive species colonising the TEC that may change the species composition overtime. Ensuring all machinery brought to site is clean and free of weed species will reduce the likelihood of invasive species colonising the retained area.

MNES critically endangered and endangered ecological communities criteria for significant impacts	Discussion of potential impacts
Interfere with the recovery of an ecological community.	The Brigalow TEC within the study area is small in size and isolated in the local landscape. The small amount of impact to the edges of this ecological community is unlikely to interfere with the recovery of this TEC.
Conclusion	**Overall, it is unlikely that the small amount of clearing will significantly impact Brigalow TEC. However, if the design to Area 4 was amended to entirely avoid RE 11.9.5, the risk of an environmental offset would be greatly reduced.**

4.3 Conservation Significant Species

The below assessments include the assessment of significant impacts to flora and fauna species at both a State and Commonwealth level, where relevant. Guideline criteria for determining if a project will have a significant impact on a species or its habitat is available for both the State and Commonwealth government levels and is detailed below.

MSES Endangered and Vulnerable Wildlife Habitat (including essential habitat)

An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:

- Lead to a long-term decrease in the size of a local population; or
- Reduce the extent of occurrence of the species; or
- Fragment an existing population; or
- Result in genetically distinct populations forming as a result of habitat isolation; or
- Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species habitat; or
- Introduce disease that may cause the population to decline, or
- Interfere with the recovery of the species; or
- Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.

MSES Special Least Concern (Non-Migratory) Animal Wildlife Habitat

An action is likely to have a significant impact on a special least concern (non-migratory) animal wildlife habitat if it is likely that it will result in:

- A long-term decrease in the size of a local population; or
- A reduced extent of occurrence on the species; or
- Fragmentation of an existing population; or
- Result in genetically distinct populations forming as a result of habitat isolation; or
- Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.

MNES Vulnerable Species

Under the EPBC Act, significant impacts to vulnerable species relate only to important populations. An important population as defined by the EPBC Act is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range (DEWHA, 2013).

If an important population of a vulnerable species is determined to occur within the proposed disturbance area, then an action is likely to have a significant impact on the species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of 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;
- Result in invasive species that are harmful to the vulnerable species becoming established in the vulnerable species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere substantially with the recovery of the species.

MNES Endangered Species

For critically endangered and endangered species, an action is likely to have a significant impact if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

4.3.1 Black Ironbox

Black Ironbox is listed as vulnerable under the EPBC Act. An assessment by SLR in 2023 recorded Black Ironbox in an additional tributary within the study area to those mapped as habitat for this species by EcoSM (2015). This additional area is shown in maps in **Appendix A11**.

This species can grow up to 30 m tall with rough longitudinally fissured bark that can reach the base of the larger branches with most upper branches smooth (DETSI, 2024b) and referenced therein). Black Ironbox grows mainly on watercourses but can occasionally occur on river flats on moderately fertile and moist soils. This species occurs in central coastal and sub-coastal Queensland from Charters Towers and Ayr, and south to Rockhampton. Two main subpopulations occur, one from Nebo north to Ayr and one from Apis Creek to Rockhampton (DEWHA, 2008). The main threats to this species are:

- Habitat loss and disturbance;
- Smothering from Rubber Vine (*Cryptostegia grandiflora*) and Chinese Apple (*Ziziphus mauritiana*);
- Timber harvesting;
- Increased fire frequency associated with increased fuel loads from weed and non-native grass species; and
- Land management that increases stream bank erosion.

A significant impact assessment for Black Ironbox can be found in **Table 11**. Overall, Hail Creek occurs at the southern and western limit of one of the main subpopulations of Black Ironbox and this subpopulation is considered an important population for this species (EcoSM, 2015). The current design impacts upon this species and its habitat in multiple portions of the study area, which may incur a significant impact. Adjusting the design to avoid this species in Areas 1 - 3 would reduce the likelihood of land-based offsets being required for this species. Amending the design around these areas would also reduce offset liability for other prescribed environmental matters (vegetation associated with a watercourse and conservation significant fauna species habitat) that overlap Black Ironbox habitat in Areas 1 - 3.

Table 11 MNES significant impact assessment for Black Ironbox

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of an important population of a species.	Black Ironbox at Hail Creek is considered to occur within an important population as Hail Creek is located near the extent of occupancy for this species. Although the area of impact to this species is small, the removal of any Black Ironbox is a decrease in the size of an important population. The watercourse mapped as habitat for this species by SLR in March 2023 is in the upper reaches of the respective watercourse in Area 1 and in close proximity to the border of ML4738. It is unknown if Black Ironbox occurs upstream and outside of the ML that could provide recruitment opportunities for the downstream environment. Other areas of habitat for this species intersect marginally with the design, in particular the watercourse between Area 2 and Area 3. If these two areas are avoided by a design,
Reduce the area of occupancy of an important population.	

MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
	any potential land-based offset for this species will likely be greatly reduced.
Fragment an existing important population into two or more populations.	The current design does not fragment the Black Ironbox population.
Adversely affect habitat critical to the survival of a species.	The small amount of clearing required within Black Ironbox habitat would not adversely affect habitat critical to the survival of the species. Black Ironbox were recorded throughout the upstream environment of Hail Creek within the ML and in high densities downstream within the existing offset area. The small amount of clearing will not disrupt the breeding cycle of this species as genetic material will still be allowed to flow downstream. Similarly, disturbance to the watercourse mapped in Area 1 as habitat for this species by SLR in March 2023 is unlikely to disrupt the breeding cycle of this species as genetic material will still be allowed to flow downstream.
Disrupt the breeding cycle of an important population.	
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	It is unlikely that the small amount of clearing will impact upon this species to the degree that the species is likely to decline in the local area.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	It is unlikely that development of the study area would introduce detrimental invasive species that are not already present in the local environment or increase the density of invasive species in the local area. Additionally, the HCOC pest animal and weed management plan monitors for invasive species and implements control measures if any are recorded. This would further reduce the likelihood of the Project introducing or increasing the population of invasive species in the local area.
Introduce disease that may cause the species to decline.	Phytophthora root fungus is a fungal disease that is known to impact on the health of Eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in Eucalypts, therefore it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. Should sufficient management strategies be implemented, then the potential for this disease to be introduced will be greatly minimised.
Interfere with the recovery of the species.	As the small amount of clearing will not inhibit the transfer of genetic material on Hail Creek it is unlikely that it will interfere with the recovery of Black Ironbox in the downstream environment of Hail Creek. Similarly, disturbance to the watercourse



MNES vulnerable species criteria for significant impacts	Discussion of potential impacts
	mapped in Area 1 as habitat for this species by SLR in March 2023 is unlikely to interfere with the recovery of the species as genetic material will still be allowed to flow downstream.
Conclusion	**The population of Black Ironbox at Hail Creek is considered an important population and current designs impact upon this species in various portions of the study area.** **If the design of Areas 1 - 3 were amended to avoid Black Ironbox habitat, there would be a reduced impact to this species aside from the proposed haul road and the likelihood of a land-based offset being required for this species would be reduced.**

4.3.2 White-throated Needletail

The White-throated Needletail is listed as vulnerable under both the NC Act and EPBC Act. This species was observed flying over the central portion of HCOC during assessments by EcoSM (2015). However, as this species was not listed as vulnerable during the development of EcoSM's (2015) report, an assessment of potential significant impacts to this species was not previously undertaken.

This trans-equatorial insectivorous species is a seasonal non-breeding visitor to Australia that inhabits aerial habitats from a height of <1 m to >1000 m above the ground. As this is an aerial species, it is considered that conventional habitat descriptions are inapplicable. However, it is notable that this species commonly occurs over a variety of wooded to open habitat types. Foraging habitat for this species includes the aerial layers that it preferentially inhabits. Additionally, this species has been documented to roost in forest and woodland trees within Australia only on rare occasions (DCCEEW, 2023). Threats to this species within Australia include collision with wind turbines, overhead wires, windows, and lighthouses. However, the scale of these threats and their potential to impact this species at a population level requires further investigation. The use of insecticides, particularly organochlorines, has been suggested as a potentially contributing to a decline in this species in addition to vegetation clearing. These factors result in predominantly indirect impacts to this species through secondary poisoning after ingesting treated insects and a reduction of invertebrate prey. Vegetation clearing may also reduce the availability of roosting sites and therefore also contribute to the declines in this species. However, it is thought that the greatest risk to this species is logging of breeding habitat and hunting in Siberia (TSSC, 2019; Tarburton, 2021).

Based on the available information, it is considered that there are no important populations, as defined within TSSC (2019) and Tarburton (2021) of this species within Australia. This is suggested as this species does not breed within Australia, occurs trans-equatorially, and forages over a wide variety of habitats that are broadly represented within Australia. As such, no further impact assessment under the MNES guidelines are required for this MNES vulnerable species. However, as this species is also listed as vulnerable under the NC Act, an assessment of significant residual impact under MSES criteria is detailed in **Table 12**. Overall, it is considered that there will be no significant residual impact to this species as a result of development of the study area.

Table 12 Significant impact assessment for White-throated Needletail

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of a local population.	It is unlikely that development of study area will reduce the extent of occurrence of this species or lead to a long-term decrease in the size of any local population. This is suggested as this species has a broad non-breeding distribution within Australia that occurs over a variety of habitat types.
Reduce the extent of occurrence of the species.	
Fragment an existing population.	It is unlikely that disturbance in the study area will fragment the population of this species within Australia or result in a genetically distinct population forming. This is suggested as development of the study area is not likely to constitute a barrier to the dispersal of this species.
Result in genetically distinct populations forming as a result of habitat isolation.	
Result in invasive species that are harmful to the species becoming established in the species' habitat.	No invasive species within Australia are identified to be harmful to this species as a whole due to the aerial habitats that this species predominantly occur within. Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Introduce disease that may cause the population to decline.	No disease is identified as potentially impacting this species within Australia. Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Interfere with the recovery of the species.	Development of the study area may reduce some infrequently used roosting habitat for this species. However, due to an abundance of other available roosting habitat within the broader region, it is unlikely that this will interfere with the recovery of this species.
Cause disruption to ecologically significant locations.	The only ecologically significant location that the study area is likely to provide for this species is foraging habitat. However, as this species forages in the area above the study area, it is unlikely that development of the area will cause any significant disruption to the foraging habitat for this species.
Conclusion	**Overall, it is considered that development of the study area is unlikely to result in a significant impact to this species.**

4.3.3 Glossy Black-Cockatoo

This species is listed as vulnerable under the NC Act and is not listed under the EPBC Act. Therefore, an assessment of significant impact will be undertaken with reference to MSES criteria only (**Table 13**). No individuals of this species were detected within HCOC during previous ecological assessments by EcoSM (2015). However, some watercourses within the ML's were identified by EcoSM (2015) to contain habitat for this species, with some of these mapped areas occurring within the study area.

This sub-species occurs in Queensland from Dawson-Mackenzie-Isaac Rivers basin, north to the Connors-Clark Ranges, south to Dawes and Many Peaks Ranges and inland to the



Expeditions, Peak and Denham Ranges, including the Blackdown Tablelands (Hourigan, 2012). Habitat for this species includes woodlands and forests with *Casuarina* and *Allocasuarina* species under a *Eucalyptus* overstory. This species can traverse over 10 km in search of feed (*Casuarina* and *Allocasuarina*) and nesting trees (large eucalypts with hollows). At HCOC, RE 11.3.25/a is mapped as habitat for this species (EcoSM, 2015).

A significant residual impact assessment for this species, based on MSES criteria, was undertaken in EcoSM (2015). Key outcomes of this assessment included that:

- Development of the area is unlikely to lead to a long-term decrease in the size of the local population;
- Low-quality habitat for this species within the ML is unlikely to provide important habitat as the presence of preferred feed trees in this habitat area are not abundant. Therefore, it is unlikely that impacts to this low-quality habitat will reduce the area of occupancy of this species;
- Development of the project area will not fragment the local population of this species as it is a highly mobile species and is likely to move throughout the landscape between preferred foraging areas;
- As no individuals of this species are likely to be impacted and this species is highly mobile, development of the ML is considered unlikely to affect gene flow of the local population;
- Development of the ML is unlikely to increase the threat of pest species that are harmful to the Glossy Black-Cockatoo. Additionally, development of the area is unlikely to introduce new weed species that are not already present and established in the Mine area and broader region. However, it is recommended that a weed and pest species management plan be implemented for the project;
- Disease is not a known threat to this species. Therefore, development of the project area is unlikely to introduce any disease that may cause this species to decline; and
- Due to the relatively small number of feed trees within the broader ML, it is unlikely that the ML forms ecologically significant habitat for this species. Regardless, it is recommended that a Species Management Program be implemented to include pre-clearance surveys to minimise any potential impacts to breeding places and individuals that may unexpectedly occur within the development area.

Overall, EcoSM (2015) suggest that there will be no significant residual impacts to this species due to development of the Hail Creek Transition Project and current assessment agrees with this outcome for the study area. The small areas of habitat within the study area are considered low quality and a significant impact to this species is unlikely.

Table 13 MSES significant impact assessment for Glossy Black-Cockatoo

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
Lead to a long-term decrease in the size of a local population.	It is unlikely that development of the study area will reduce the extent of occurrence of this species or lead to a long-term decrease in the size of any locally population. This is suggested as foraging opportunities within the study area are limited.
Reduce the extent of occurrence of the species.	
Fragment an existing population.	

MSES vulnerable species criteria for significant impacts	Discussion of potential impacts
Result in genetically distinct populations forming as a result of habitat isolation.	It is unlikely that disturbance to the relatively small area of habitat for this species will fragment the population or result in a genetically distinct population forming. As this is a highly mobile species, development of the study area is not likely to constitute a barrier to the dispersal of this species.
Result in invasive species that are harmful to the species becoming established in the species' habitat.	Some invasive species such as African boxthorn (*Lycium ferocissimum*), Gazania spp., Buffel grass (*Cenchrus ciliaris*) and other invasive grass species are known to reduce habitat quality for this species. The development of the study area is unlikely to introduce any new weed species into the area that are not already prevalent. Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Introduce disease that may cause the population to decline.	No disease is identified as potentially impacting this species within Australia. Therefore, it is unlikely that development of the study area will increase any potential or known impacts.
Interfere with the recovery of the species.	Development of the study area may reduce some low-quality foraging habitat for this species. However, due to an abundance of other available foraging habitat within the broader region, it is unlikely that this will interfere with the recovery of this species.
Cause disruption to ecologically significant locations.	There is unlikely to be any ecologically significant locations for Glossy Black-Cockatoo within the study area due to the sparse occurrence of potential feed trees.
Conclusion	**Overall, it is considered that development of the study area is unlikely to result in a significant impact to this species.**

4.3.4 Squatter Pigeon (Southern)

This species is listed as vulnerable under both the NC Act and EPBC Act and was recorded within HCOC at several locations during previous ecological assessments by EcoSM (2015). Additionally, ground-truthing activities by EcoSM (2015) identify that all remnant vegetation, with the exception of RE 11.9.4 and RE 11.9.5, within the study area comprises potentially high-value habitat for this species. RE 11.9.4 and RE 11.9.5 were considered to comprise low quality habitat due to these communities being considered too dense or waterlogged and less likely to be used by this species aside from movement between more suitable habitats (EcoSM, 2015). State-mapped essential habitat occurs within the study area for Squatter Pigeon (Southern) with all confirmed by field assessments.

All relatively small, isolated and sparsely distributed sub-populations occurring south of Carnarvon Ranges in Central Queensland are considered to be important sub-populations of this species (DCCEEW, 2023). These include, but are not limited to those that:

- Occur in the Condamine River catchment and Darling Downs of southern Queensland;
- Are known to occur in the Warwick-Inglewood-Texas region of southern Queensland; and
- Any populations potentially occurring in northern New South Wales.

As HCOC occurs well north of the Carnarvon Ranges and does not occur within any of these areas identified to comprise important populations of this species, it is considered that there are no important populations of this species within the study area. Therefore, no further impact assessment under the MNES guidelines are required for this EPBC Act vulnerable species. This conclusion is consistent with that provided within EcoSM (2015) for the Hail Creek Transition Project. However, a review of potential significant residual impacts to this species under the NC Act is provided in **Table 14**.

Overall, development of the study area will impact upon an ecologically significant location for Squatter Pigeon (Southern). This includes impacts upon habitat that is used for breeding, feeding, nesting and resting which is a significant residual impact to this species and the provision of an environmental offset may be required.

Table 14 Significant impact assessment for Squatter Pigeon (Southern)

MSES criteria	Response to criteria
Lead to a long-term decrease in the size of a local population.	The study area is not considered to contain an important population for this species, and the Squatter Pigeon (Southern) is common in the northern portions of its range. As broad areas of similar habitat occur outside of the ML it is unlikely that the development within the study area will lead to a long-term decrease in the size of the local population.
Reduce the extent of occurrence of the species.	The study area is not considered to contain an important population for this species, and the Squatter Pigeon (Southern) is common in the northern portions of its range. Development within the study area is unlikely to reduce the extent of occurrence of this species as it has been recorded in various habitats surrounding the HCOC ML, including HNP, and HCOC is not located near the edges of this species known range.
Fragment an existing population.	It is unlikely that development within the study area will fragment an existing population as the study area is an extension of approved and/or existing disturbance and large areas of remnant vegetation that would be considered habitat for this species border the HCOC ML to the east and north.
Result in genetically distinct populations forming as a result of habitat isolation.	As no fragmentation of existing habitat is likely to occur it is unlikely that any habitat for Squatter Pigeon (Southern) will be isolated leading towards a genetically distinct population.

MSES criteria	Response to criteria
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	It is unlikely that development of the study area would introduce detrimental invasive species that are not already present in the local environment or increase the density of invasive species in the local area. Additionally, the HCOC pest animal and weed management plan monitors for invasive species and implements control measures if any are recorded. This would further reduce the likelihood of the Project introducing or increasing the population of invasive species in the local area.
Introduce disease that may cause the population to decline.	There are no known diseases that impact upon this species, and it is unlikely that the Project would introduce any diseases that would reduce the local population.
Interfere with the recovery of the species.	Clearing of habitat within the study area is unlikely to interfere with the recovery of this species as large expanses of remnant vegetation occur outside of HCOC and the population around HCOC are not considered an important population.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	The study area contains habitat that is used for breeding, feeding, nesting and resting for Squatter Pigeon (Southern). Similar habitat is found in the local area however a disruption to ecologically significant locations within the study area will occur from development of the study area.
Conclusion	**Development within the study area will impact upon habitat that is used for breeding, feeding, nesting and resting which is a significant residual impact to this species and the provision of an environmental offset may be required.**

4.3.5 Koala

This species is listed as endangered under both the NC Act and EPBC Act and was identified to occur at eight locations within HCOC during previous ecological assessments by EcoSM (2015). However, no observations of this species were made within the proposed study area. Assessments undertaken in EcoSM (2015) identify the population of Koala within the study area to be an important population and that HCOC contains critical habitat for the Koala under the EPBC Act referral guidelines. Additionally, the majority of the study area is mapped as habitat for Koala (EcoSM, 2015). RE 11.3.25a is considered high quality habitat for this species due to the density of the riparian vegetation, the floristic structure and diversity present and the increased leaf moisture due to semi-permanent water being available. Other areas of Koala habitat within the study area are of lower quality as they occur in open woodlands with little connectivity between canopies, are further away from semi-permanent water, which results in lower leaf moisture, and are modified areas for livestock grazing.

Key conclusions to MNES and MSES significant impact assessments completed by EcoSM (2015) for impacts from the development of the Hail Creek Transition Project were that:

"The Project has the potential to cause a significant impact to the Koala due to the large area of critical habitat that is proposed to be cleared and the potential for the local population to constitute part of an important population. However, it is considered unlikely that there will be a decrease in the local population in the long term due to the extensive habitat that occurs in the region. The impacts to the Koala can be offset by an appropriate offset strategy."

As this species was previously determined to be potentially significantly impacted by development of the Hail Creek Transition Project an additional assessment is provided below to refine this assessment to development of the study area (**Table 15**). Results from this refined assessment are similar to those provided within EcoSM (2015), indicating that impacts to Koala habitat, which takes up the majority of the study area, are difficult to avoid. Therefore, if this habitat is to be cleared, then the provision of an offset may be required. To reduce impacts to higher quality habitat, the design should be amended to avoid the small portions of RE 11.3.25a that marginally intercept with Areas 1 - 3 (**Appendix A9**). Amending the design around these areas would also reduce offset liability for other prescribed environmental matters that overlap Koala habitat in Areas 1 - 3.

This species is listed as endangered under both the NC Act and EPBC Act and was identified to occur at eight locations within HCOC during previous ecological assessments by EcoSM (2015). However, no observations of this species were made within the proposed study area. Assessments undertaken in EcoSM (2015) identify the population of Koala within the study area to be an important population and that HCOC contains critical habitat for the Koala under the EPBC Act referral guidelines. Additionally, the majority of the study area is mapped as habitat for Koala (EcoSM, 2015). RE 11.3.25a is considered high quality habitat for this species due to the density of the riparian vegetation, the floristic structure and diversity present and the increased leaf moisture due to semi-permanent water being available. Other areas of Koala habitat within the study area are of lower quality as they occur in open woodlands with little connectivity between canopies, are further away from semi-permanent water, which results in lower leaf moisture, and are modified areas for livestock grazing.

Key conclusions to MNES and MSES significant impact assessments completed by EcoSM (2015) for impacts from the development of the Hail Creek Transition Project were that:

"The Project has the potential to cause a significant impact to the Koala due to the large area of critical habitat that is proposed to be cleared and the potential for the local population to constitute part of an important population. However, it is considered unlikely that there will be

a decrease in the local population in the long term due to the extensive habitat that occurs in the region. The impacts to the Koala can be offset by an appropriate offset strategy."

As this species was previously determined to be potentially significantly impacted by development of the Hail Creek Transition Project an additional assessment is provided below to refine this assessment to development of the study area (**Table 15**). Results from this refined assessment are similar to those provided within EcoSM (2015), indicating that impacts to Koala habitat, which takes up the majority of the study area, are difficult to avoid. Therefore, if this habitat is to be cleared, then the provision of an offset may be required. To reduce impacts to higher quality habitat, the design should be amended to avoid the small portions of RE 11.3.25a that marginally intercept with Areas 1 - 3 (**Appendix A9**). Amending the design around these areas would also reduce offset liability for other prescribed environmental matters that overlap Koala habitat in Areas 1 - 3.

Table 15 Significant impact criteria for Koala

MNES criteria	MSES criteria	Response to criteria
Lead to a long-term decrease in the size of a population.	Lead to a long-term decrease in the size of a local population.	The sub-population of Koalas in the study area are potentially part of an important population. The proposed action will impact Koala habitat; however, extensive areas of similar habitat occur in the local region. There is potential for a small, short-term decrease in the local population, yet it is considered unlikely a long-term decrease will occur due to the extensive areas of connected habitat that occur in the broader landscape.
Reduce the area of occupancy of the species.	Reduce the extent of occurrence of the species.	The proposed action will impact Koala habitat, however, it is unlikely that it will reduce the extent of occurrence of Koala as HCOC is not located near an edge of this species' known distribution.
Fragment an existing population into two or more populations.	Fragment an existing population.	The majority of disturbance to protected Koala habitat is unlikely to fragment a population as individuals will be able to move throughout the wider landscape.
NA	Result in genetically distinct populations forming as a result of habitat isolation.	The majority of disturbance to protected Koala habitat is unlikely to disrupt or isolate a population as individuals will be able to move throughout the wider landscape.
Adversely affect habitat critical to the survival of a species.	NA	Koala habitat will be impacted within the study area. RE 11.3.25a is considered high quality habitat for this species due to the vegetation communities species composition and leaf moisture content. Other areas of Koala habitat within the study area are considered lower quality as they occur further away from semi-permanent water and are within modified areas used for livestock grazing. It is unlikely that development within low quality habitat will adversely affect habitat critical to the survival of a species. The study area marginally intersects with some areas of RE 11.3.25a (Areas 1 - 3). Impacts to RE 11.3.25a increases the risk of an offset being required for this prescribed environmental matter. If the design was amended to avoid areas of RE

MNES criteria	MSES criteria	Response to criteria
		11.3.25a within Areas 1 - 3, the risk of a significant impact to Koala will be greatly reduced.
Disrupt the breeding cycle of a population.	NA	The disturbance of protected Koala habitat is unlikely to disrupt the breeding population as individuals will be able to move throughout the wider landscape.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	NA	The proposed action will impact protected Koala habitat. There is potential that the reduction of habitat will result in increased pressure upon remaining habitat and lead to a short-term decrease in population. However, large areas of similar habitat are present outside of the study area and habitat connectivity will remain intact. It is unlikely the proposed action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.	Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat.	The study area is located within a modified grazing landscape where introduced plants and animals have previously been identified (EcoSM, 2015). Overgrazing from domesticated herbivores and habitat degradation through invasive pasture improving species are recognised as current threats for this species. However, as the proposed action occurs within areas currently utilised for cattle grazing it is unlikely the proposed action will introduce additional invasive species or increase the presence of such species. Pest species management will be implemented to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the species to decline.	Introduce disease that may cause the population to decline.	Throughout the entirety of the species distribution, with the exception of populations from South Australia and French Island (Victoria), Koalas are impacted by chlamydia (DCCEEW, 2023). Another disease identified to impact Koalas is the Koala Retrovirus (KoRV) and up to 100 % of Koalas in Queensland and New South Wales are identified to have KoRV (DCCEEW, 2023). Due to the lack of recent records, there is no information available on disease prevalence for the local area of the proposed action. However, as chlamydia and KoRV is identified to impact populations of Koala across significant portions of its overall range it is unlikely that the proposed action will introduce further disease that would cause the species to decline within the local or broader area. Although not known to occur in the local area, phytophthora root fungus is a fungal disease that is known to impact on the health of Eucalypts. Any

MNES criteria	MSES criteria	Response to criteria
		activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in Eucalypts, which this species relies on. Therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. Should sufficient management strategies be implemented, then the potential for this disease to be introduced will be greatly minimised.
Interfere with the recovery of the species.	Interfere with the recovery of the species.	The main objectives that are set out in the National Recovery Plan for Koala (DAWE, 2022), include: • The area of occupancy and estimated size of population that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased; • The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased; • Metapopulation processes are maintained or improved; and • Partners, communities and individuals have a greater role and capability in listed Koala monitoring, conservation and management. The removal of Koala habitat within the study area will interfere with the recovery of the species by decreasing available habitat. This would not align with the objectives for the recovery of Koala of stabilising or increasing the estimated size of populations.
NA	Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	It is likely habitat within the study area represents part of an ecologically significant location for breeding, feeding and resting for Koala. Impacts to Koala habitat within the study area will cause a significant impact to ecologically significant locations for Koala.
Conclusion	**Impacts to Koala habitat within the study area will be unavoidable and will cause a significant impact to this species.**	

4.3.6 Southern and Central Greater Glider

The Southern and Central Greater Glider (*Petauroides volans (armillatus*)) is listed under the EPBC Act as Greater Glider (southern and central; *Petauroides volans*) and is endangered under the EPBC Act and NC Act. Habitat for this species is mapped within the study area (**Appendix A12**). Significant impact assessments for this species from development of the study area are detail in **Table 16**.



The Southern and Central Greater Glider (*Petauroides volans (armillatus)*) has recently been split from the nominate species (*Petauroides volans*) due to morphological and genetic differences (McGregor *et. al.,* 2020). As such, little specific information is currently available for this new species. However, the life history traits and habitat requirements of the Southern and Central Greater Glider remain similar to the nominate species and therefore habitat requirements and threats remain similar. Therefore, the relevant listing advice for the nominate species is relevant to the Southern and Central Greater Glider and will be referenced in this report in lieu of more species-specific information.

This nocturnal species occurs from just north of Townsville, south to the Eungella range along the Great Dividing Range where it forages on gum leaves, buds and flowers. This species inhabits eucalypt-dominated coastal low open forests to tall forests in the ranges and low woodlands west of the Great Dividing Range (Van Dyck *et al.*, 2013). Typically, this species is found in highest abundance in tall, montane, moist eucalypt forests with relatively old trees and abundant hollows, although distribution may be patchy even in suitable habitat. Home ranges of this species are typically relatively small, although ranges are larger in low-productivity forests and more open woodlands (DCCEEW, 2022). This is a folivorous species that primarily feeds upon eucalypt leaves and favours environments where multiple eucalypt species are present to account for seasonal variation (DCCEEW, 2022). The species is particularly vulnerable to habitat fragmentation as they require two to four dens for every two ha of suitable habitat and have low dispersal ability (DCCEEW, 2022). The Southern and Central Greater Glider is also sensitive to logging and wildfire and is slow to recover following major disturbance.

There are no defined important populations of this species, therefore assessment must be undertaken on a case by case basis (DCCEEW, 2023a). The conservation advice for Southern and Central Greater Glider states that all populations of the Greater Glider (Southern and Central) are important for the conservation of the species across its range (DCCEEW, 2022). This species was recorded multiple times within HCOC and RE 11.3.25a is considered high quality habitat for this species due to the floristic complexity, density and presence of hollow bearing trees (Eyre et al, 2022). Overall, it is considered that areas of high-quality habitat are important populations and a further impact assessment under the MNES vulnerable species guidelines and MSES vulnerable species guidelines is provided below (**Table 16**).

Results of this assessment indicate that the development of the study area is unlikely to result in a significant residual impact to Southern and Central Greater Glider. To further reduce any risk of an environmental offset being required, the design should be amended to avoid the small portions of RE 11.3.25a that marginally intercept with Areas 1 - 3 (**Appendix A12**). Amending the design around these areas would also reduce offset liability for other prescribed environmental matters that overlap Southern and Central Greater Glider habitat in Areas 1 - 3.

Table 16 Significant impact assessment for Southern and Central Greater Glider

MNES criteria	MSES criteria	Response to criteria
Lead to a long-term decrease in the size of a population.	Lead to a long-term decrease in the size of a local population.	High-quality habitat (RE 11.3.25a) is considered to equate to an important population for this species. The proposed action will impact small areas of Southern and Central Greater Glider habitat including small areas of RE 11.3.25a. It is unlikely that the small amount of impact within the study area will lead to a long-term decline of an important population or a local population of this species as connectivity within the local area will be retained

MNES criteria	MSES criteria	Response to criteria
		and some areas of habitat are currently isolated in the local area. If the design was amended to avoid areas of RE 11.3.25a in Areas 1 - 3, the risk of a significant impact to a MNES will be greatly reduced.
Reduce the area of occupancy of the species.	Reduce the extent of occurrence of the species.	The proposed action will impact Southern and Central Greater Glider habitat but will not reduce the extent of occurrence of this species as HCOC is not located on the edge of this species distribution.
Fragment an existing population into two or more populations.	Fragment an existing population.	It is unlikely that the small amount of clearing of RE 11.3.25a in the study area would fragment an existing population.
NA	Result in genetically distinct populations forming as a result of habitat isolation.	. It is unlikely that the small amount of clearing of RE 11.3.25a in the study area would isolate any populations of Southern and Central Greater Glider that would lead to a genetically distinct population.
Adversely affect habitat critical to the survival of a species.	NA	The proposed action will impact protected Southern and Central Greater Glider habitat; however, habitat within Areas 2 and 4 are currently isolated and impacts to these are unlikely to adversely affect any habitat critical to the survival of this species. The study area impedes upon small areas of RE 11.3.25a, mainly between Areas 2 and 3 and a small portion in Area 1. RE 11.3.25a is high quality habitat for this species but due to the small amount of clearing of this habitat, it is unlikely to adversely affect any habitat critical to the survival of this species. Amending the design to avoid these areas of RE 11.3.25a will further reduce the risk of significant impact to this MNES.
Disrupt the breeding cycle of a population.	NA	It is unlikely that the small amount of clearing of RE 11.3.25a in the study area would disrupt the breeding cycle.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	NA	Due to the small amount of Southern and Central Greater Glider habitat present within the study area and that the majority is currently isolated, it is unlikely that development within the study area will cause this species to decline.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.	Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat.	The study area is located within a modified grazing landscape where introduced plants and animals have been identified (EcoSM, 2015). Threats from invasive species includes predation by feral cats and foxes and increased fuel loads from invasive flora species that increase the frequency and/or intensity of fires. As the study area is maintained as livestock grazing it is unlikely that the Project will introduce any additional invasive flora species or increase the presence of such species. Additionally, pest



MNES criteria	MSES criteria	Response to criteria
		species management will be implemented to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the species to decline	Introduce disease that may cause the population to decline	There are no known diseases that are a direct threat to this species. Phytophthora root fungus is a fungal disease that is known to impact on the health of Eucalypts. Any activity that moves soil, water, or plant material can spread the fungus and result in Phytophthora dieback. Therefore, inadequately cleaned machinery or other materials brought into areas approved for clearing have the potential to introduce this disease and facilitate secondary impacts into nearby, uncleared, vegetation. The introduction of this fungal disease can cause disease and death in Eucalypts, which this species relies on. Therefore, it has the potential to result in population declines of this species. The washdown of machinery and equipment is critical to reducing the spread of this disease. Should sufficient management strategies be implemented, then the potential for this disease to be introduced will be greatly minimised.
Interfere with the recovery of the species	Interfere with the recovery of the species	It is unlikely that development within the study area will interfere with the recovery of this species.
NA	Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	High quality for this species occurs in RE 11.3.25a. The proposed action will impact small areas of Southern and Central Greater Glider habitat including small areas of RE 11.3.25a. If the design was amended to avoid areas of RE 11.3.25a, the risk of a significant impact to this MSES will be greatly reduced.
Conclusion	**There is potential that Southern and Central Greater Glider will be significantly impacted due to the current study area.**	

4.3.7 Ornamental Snake

This species is listed as vulnerable under both the NC Act and EPBC Act and was identified to occur in high-quality habitat areas during previous ecological assessments by EcoSM (2015) within HCOC. Species records and high-quality habitat are depicted in habitat mapping in **Appendix A5**. MSES essential habitat for this species was ground-truthed and occurs with RE 11.3.25a, 11.3.4, 11.4.2 and 11.9.7 within the study area (DoR, 2023).

The Commonwealth environment department considers that an occurrence of important habitat for this species is a surrogate for an ‘important population’ of the species. It is

considered that species records within HCOC likely indicate preferred high-quality habitat for this species which would also equate to important populations. These important populations occur at Brumby waterhole which is outside the study area. As this species was not recorded within habitat that occurs within the study area, these areas are considered to be of low quality and not considered to contain an important population of this species. Therefore, MNES significant impact assessments for vulnerable species have not been undertaken. However, MSES significant residual impact assessments are provided in **Table 17**.

Overall, there are no important populations of this species within the study area and no significant impacts to a MNES will occur. Lower quality habitat occurs within the study area and impacts to this habitat will cause disruption to ecologically significant locations that contain opportunities for feeding, resting and movement between areas of higher quality habitat. Due to this, there will be a significant impact to the prescribed environmental matter.

Table 17 Significant impact assessment for Ornamental Snake

MSES criteria	Response to criteria
Lead to a long-term decrease in the size of a local population.	It is considered that species records within HCOC likely indicate preferred high-quality habitat for this species, which would also equate to important populations. High quality habitat occurs at Brumby waterhole. As the study area does not incorporate any of the important population areas, or any areas where records occur, it is considered unlikely that disturbance to lower quality habitat within the study area would lead to a long-term decrease of the species.
Reduce the extent of occurrence of the species.	As HCOC does not occur near the edge of this species know distribution, there is unlikely to be a reduction in the extent of the species occurrence from the clearing of habitat that occurs within the study area.
Fragment an existing population.	The clearing of habitat for Ornamental Snake within the study area is unlikely to lead to the fragmentation of any populations.
Result in genetically distinct populations forming as a result of habitat isolation.	The disturbance of Ornamental Snake habitat is unlikely to disrupt the breeding cycle or isolate any populations. Therefore, the Project is unlikely to result in any genetically distinct populations forming due to habitat isolation.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat.	The study area is located within a modified grazing landscape where introduced plants and animals have been identified (EcoSM, 2015). Predation by feral pigs, dogs, foxes and cats are known threats to this species but it is unlikely that the proposed action will introduce additional invasive species or increase the abundance of such species. Pest species management will be implemented to reduce the threat to local biodiversity values from invasive pest species. Therefore, invasive species are unlikely to have an additional impact other than what is already present.
Introduce disease that may cause the population to decline.	There are no known diseases that impact Ornamental Snake and it is unlikely that development of the study area would introduce any disease that would cause the population to decline.
Interfere with the recovery of the species.	Although some habitat within the study area will be impacted, no Ornamental Snakes were recorded in these areas, and they are considered low quality habitat for this species. Places where this species has previously been recorded (Brumby waterhole) are considered to be high quality habitat and occur outside of the study area. As these higher quality areas are avoided, it is unlikely that disturbance to the habitat within the study area will interfere with the recovery of the species.



MSES criteria	Response to criteria
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	All high-quality areas for Ornamental Snake have been avoided. However, some habitat for this species occurs within the study area that, although low quality, would provide some opportunities for feeding, resting and movement between areas of higher quality habitat. Due to this, impacts to Ornamental Snake habitat within the study area will cause disruption to ecologically significant locations for this species.
Conclusion	**Low quality habitat occurs within the study area and will be impacted. Although of low quality, the habitat provides some opportunities for feeding, resting and movement between areas of higher quality habitat. Due to this, there may be a significant impact to this prescribed environmental matter.**

4.3.8 Short-beaked Echidna

One NC Act special least concern species, the Short-beaked Echidna, was identified to occur within HCOC during previous ecological assessments by EcoSM (2015), and habitat for this species was ground-truthed to occur broadly across HCOC, including throughout the study area.

A broad-scale assessment of significant impacts to this species was undertaken as part of EcoSM (2015) within HCOC, which included assessment of the study area. Results from this assessment are detailed below:

"The entire study area forms habitat for this species and this habitat occurs extensively in the region. This species has no particular habitat requirements and habitat occurs extensively in the broader region. Therefore, the project is considered unlikely to significantly impact the Short-beaked Echidna."

Overall, as the study area was considered in this previous assessment of broad-scale impact, and the study area is smaller than the previously proposed footprint, it is unlikely that development of the study area will result in a significant residual impact to this species (**Table 18**).

Table 18 MSES significant residual impact assessment for Short-beaked Echidna

MSES special least concern species criteria for significant impacts	Discussion of potential impacts
A long-term decrease in the size of a local population.	Development of the study area may lead to a reduction of suitable habitat for this species. However, this area of suitable habitat occurs on the periphery of large tracks of similar habitat in the broader area. As this species does not have a particular habitat requirement and that vast areas of similar habitat occur in the broader landscape, it is unlikely that the development of the study area will cause a long-term decrease in the size of the local population.
A reduced extent of occurrence of the species.	The study area was mapped by EcoSM (2015) as containing suitable habitat for this species. It is unlikely that the development of the study area will cause a reduction in the extent of occurrence of this species as this species does not have a particular habitat requirement, HCOC does not occur near the limits of this species



MSES special least concern species criteria for significant impacts	Discussion of potential impacts
	range due to it occurring throughout Australia, and that vast areas of similar habitat occur in the broader landscape.
Fragmentation of an existing population.	It is unlikely that disturbance of the study area will fragment any populations of Short-beaked Echidna or lead to genetically distinct populations.
Result in genetically distinct populations forming as a result of habitat isolation.	
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.	The study area is unlikely to represent an ecologically significant location for this species as this species does not have a particular habitat requirement and vast amount of similar habitat occurs in the broader landscape.
Conclusion	**It is unlikely that the development of the study area will significantly impact this species.**

5.0 Conclusion and Recommendations

HCOC are amending their EA to develop portions of the Hail Creek Eastern Margin Expansion Project. These areas occur outside of their approved disturbance and collectively form the study area for this Ecological Assessment Report. Assessment of significant impacts to MNES and MSES was previously undertaken by EcoSM (2015) for the Hail Creek Transition Project. As the current study area forms a small part of the previous area assessed, the EcoSM (2015) habitat mapping for conservation significant species is relevant and was validated through contemporary desktop and field assessments. Some additional habitat mapping was also performed as part of this study for threatened species that were not listed under State and Commonwealth legislation at the time of the EcoSM (2015) report.

This report provides a review of the EcoSM report (2015) and includes contemporary desktop and field assessments to map and characterise MSES and MNES terrestrial ecology matters. Contemporary significant impact assessments have been performed for those matters relevant to the Hail Creek Eastern Margin Expansion Project to identify potential environmental offset liability and opportunities for biodiversity conservation and impact avoidance to reduce the overall offset liability.

Due to the resource location, some environmental matters such as regulated vegetation, vegetation associated with a watercourse and some conservation significant species habitat will be unavoidable. Therefore, development of the study area will significantly impact upon some MSES and MNES, and environmental offsets will be required as part of State and Commonwealth approvals. Offset requirements for MNES are typically provided as a land-based offset and some of the significant impacts to MNES identified in this report, such as Koala, may require a large land-based offset. While significant residual impacts to multiple matters will be unavoidable, to avoid/reduce impacts and offset liability for some matters, SLR recommends the following:

- Consider amendments to the design of Areas 1 - 3 to exclude the small portions of RE 11.3.25a that marginally intercept the designs. This will reduce the overall offset liability for multiple environmental matters, including:
    - Vegetation associated with a watercourse; and
    - Habitat for Glossy Black-Cockatoo, Black Ironbox, Koala and Southern and Central Greater Glider. For Glossy Black-Cockatoo and Black Ironbox, the avoidance of these areas may avoid significant impacts to these species entirely.

Consider amendments to the design of Area 4 to exclude RE 11.9.5. Excluding RE 11.9.5 will negate an offset liability for the Brigalow TEC.

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Appendix A1 EPBC Act Protected Matters Search Tool report

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 11-Jun-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	34
Listed Migratory Species:	14

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	9
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area	In feature area
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community may occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area	In feature area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Geophaps scripta scripta			
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Neochmia ruficauda ruficauda			
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
Poephila cincta cincta			
Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata			
Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Tyto novaehollandiae kimberli			
Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			
Dasyurus hallucatus			
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area	In feature area
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Nyctophilus corbeni			
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
PLANT			
Arthraxon hispidus			
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dichanthium queenslandicum			
King Blue-grass [5481]	Endangered	Species or species habitat may occur within area	In feature area
Dichanthium setosum			
bluegrass [14159]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus raveretiana			
Black Ironbox [16344]	Vulnerable	Species or species habitat known to occur within area	In feature area
Omphalea celata			
[64586]	Vulnerable	Species or species habitat known to occur within area	In feature area
Ozothamnus eriocephalus			
[56133]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phalaenopsis rosenstromii listed as Phalaenopsis amabilis subsp. rosenstromii			
Native Moth Orchid [15984]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phlegmariurus tetrastichoides			
Square Tassel Fern [86555]	Vulnerable	Species or species habitat may occur within area	In feature area
Polianthion minutiflorum			
[82772]	Vulnerable	Species or species habitat may occur within area	In feature area
Samadera bidwillii			
Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Solanum graniticum			
Granite Nightshade [84819]	Endangered	Species or species habitat likely to occur within area	In feature area
REPTILE			
Denisonia maculata			
Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area	In feature area
Egernia rugosa			
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area
Elseya albagula			
Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rheodytes leukops			
Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus			
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
[Anseranas semipalmata](#) Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Bubulcus ibis as Ardea ibis](#) Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus			
Spectacled Monarch [83946]		Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Homevale	Conservation Park	QLD	In buffer area only
Homevale	Resources Reserve	QLD	In buffer area only
Homevale	National Park	QLD	In feature area

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Lake Elphinstone	QLD	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Urannah Dam and Pipelines Project	2020/8708		Completed	In feature area
Controlled action				
Arrow Bowen Pipeline (CSG), QLD	2012/6459	Controlled Action	Post-Approval	In buffer area only
Bowen Gas Project	2012/6377	Controlled Action	Post-Approval	In feature area
Hail Creek coal mine extension transition project, Bowen Basin, Qld	2014/7240	Controlled Action	Post-Approval	In feature area
Hillalong coal mine and associated infrastructure project	2012/6566	Controlled Action	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
The Broughton Coal Mine Project, Bowen Basin, QLD	2014/7132	Controlled Action	Completed	In feature area
Not controlled action				
Hail Creek open cut coal mine expansion	2006/2506	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Nebo to Strathmore 275kV Transmission Line	2006/2997	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Canberra ACT 2601 Australia
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Appendix A2 WildNet Online Database Extract

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Queensland status: All
Records: All
Date: All
Latitude: -21.4818
Longitude: 148.4083
Distance: 10
Email: sharte@slrconsulting.com
Date submitted: Friday 31 Mar 2023 11:44:45
Date extracted: Friday 31 Mar 2023 11:50:02

The number of records retrieved = 449

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	*Cyclorana brevipes*	superb collared frog		C		2
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		3
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		5
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		2
animals	amphibians	Hylidae	*Litoria inermis*	bumpy rocketfrog		C		5
animals	amphibians	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog		C		4
animals	amphibians	Hylidae	*Litoria rothii*	northern laughing treefrog		C		3
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		1
animals	amphibians	Limnodynastidae	*Adelotus brevis*	tusked frog		V		1
animals	amphibians	Limnodynastidae	*Limnodynastes salmini*	salmon striped frog		C		2
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		3
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		6
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		1
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		9
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		12
animals	birds	Accipitridae	*Accipiter novaehollandiae*	grey goshawk		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		2
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		5
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		2
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		1
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		6
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		3
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		3
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		1
animals	birds	Alcedinidae	*Dacelo leachii*	blue-winged kookaburra		C		6
animals	birds	Alcedinidae	*Dacelo novaeguineae*	laughing kookaburra		C		11
animals	birds	Alcedinidae	*Todiramphus macleayii*	forest kingfisher		C		4
animals	birds	Alcedinidae	*Todiramphus sanctus*	sacred kingfisher		C		1
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		3
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		5
animals	birds	Anatidae	*Aythya australis*	hardhead		C		2
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		3
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		1
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		3
animals	birds	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose		C		1
animals	birds	Anatidae	*Nettapus pulchellus*	green pygmy-goose		C		1
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		3
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		1
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		2
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		2
animals	birds	Ardeidae	*Bubulcus ibis*	cattle egret		C		1
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		3
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		2
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		1
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		8

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animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		5
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		12
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		8
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		10
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		7
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		2
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		14
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		3
animals	birds	Campephagidae	*Edolisoma tenuirostre*	common cicadabird		C		2
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		1
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		3
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		2
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		1
animals	birds	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel		C		1
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		3
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		1
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		2
animals	birds	Climacteridae	*Climacteris picumnus*	brown treecreeper		C		1
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		1
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		1
animals	birds	Columbidae	*Geopelia placida*	peaceful dove		C		4
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	6
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		3
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		8
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		5
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		3
animals	birds	Corvidae	*Corvus bennetti*	little crow		C		5
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		3
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		10
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		2
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		3
animals	birds	Cuculidae	*Chalcites minutillus*	little bronze-cuckoo		C		3
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		9
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		8
animals	birds	Dicaeidae	*Dicaeum hirundinaceum*	mistletoebird		C		1
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		3
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		1
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		6
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		1
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		3
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		5
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		1
animals	birds	Gruidae	*Antigone rubicunda*	brolga		C		5
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		1
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		1
animals	birds	Jacanidae	*Irediparra gallinacea*	comb-crested jacana		C		1

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animals	birds	Maluridae	*Malurus assimilis*	purple-backed fairy-wren		C		1
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		10
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		8
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		2
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		5
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		9
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		1
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		3
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		9
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		1
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		9
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		15
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		2
animals	birds	Meliphagidae	*Stomiopera flava*	yellow honeyeater		C		3
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		5
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		7
animals	birds	Monarchidae	*Monarcha melanopsis*	black-faced monarch		SL		1
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		1
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		6
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		1
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		4
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		5
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		4
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		2
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		3
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		7
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		13
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		1
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		3
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		1
animals	birds	Phasianidae	*Coturnix pectoralis*	stubble quail		C		1
animals	birds	Phasianidae	*Synoicus ypsilophorus*	brown quail		C		4
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		4
animals	birds	Podicipedidae	*Poliocephalus poliocephalus*	hoary-headed grebe		C		1
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		2
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		4
animals	birds	Psittaculidae	*Aprosmictus erythropterus*	red-winged parrot		C		10
animals	birds	Psittaculidae	*Parvipsitta pusilla*	little lorikeet		C		1
animals	birds	Psittaculidae	*Platycercus adscitus*	pale-headed rosella		C		11
animals	birds	Psittaculidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		2
animals	birds	Psittaculidae	*Trichoglossus moluccanus*	rainbow lorikeet		C		16
animals	birds	Ptilonorhynchidae	*Chlamydera maculata*	spotted bowerbird		C		2
animals	birds	Ptilonorhynchidae	*Chlamydera nuchalis*	great bowerbird		C		1
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		1

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animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		2
animals	birds	Rallidae	*Gallirallus philippensis*	buff-banded rail		C		1
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		6
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		9
animals	birds	Rhipiduridae	*Rhipidura rufifrons*	rufous fantail		SL		3
animals	birds	Scolopacidae	*Gallinago hardwickii*	Latham's snipe		SL		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		1
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		1
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		3
animals	birds	Turnicidae	*Turnix varius*	painted button-quail		C		1
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		1
animals	mammals	Acrobatidae	*Acrobates pygmaeus*	feathertail glider		C		1
animals	mammals	Canidae	*Canis familiaris (dingo)*	dingo				2
animals	mammals	Dasyuridae	*Planigale ingrami*	long-tailed planigale		C		1
animals	mammals	Dasyuridae	*Planigale maculata*	common planigale		C		1
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		7
animals	mammals	Emballonuridae	*Taphozous troughtoni*	Troughton's sheathtail bat		C		3
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		6
animals	mammals	Macropodidae	*Notamacropus parryi*	whiptail wallaby		C		1
animals	mammals	Megadermatidae	*Macroderma gigas*	ghost bat		E	V	1
animals	mammals	Miniopteridae	*Miniopterus australis*	little bent-wing bat		C		4
animals	mammals	Miniopteridae	*Miniopterus schreibersii oceanensis*	eastern bent-wing bat		C		5
animals	mammals	Molossidae	*Chaerephon jobensis*	northern freetail bat		C		4
animals	mammals	Molossidae	*Mormopterus lumsdenae*	northern free-tailed bat		C		7
animals	mammals	Molossidae	*Mormopterus ridei*	eastern free-tailed bat		C		2
animals	mammals	Molossidae	*Mormopterus sp.*			C		1
animals	mammals	Petauridae	*Petaurus notatus*	Krefft's glider		C		1
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		4
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	4
animals	mammals	Potoroidae	*Aepyprymnus rufescens*	rufous bettong		C		5
animals	mammals	Pseudocheiridae	*Petauroides armillatus*	central greater glider		E	E	4
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		3
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		8
animals	mammals	Vespertilionidae	*Chalinolobus morio*	chocolate wattled bat		C		3
animals	mammals	Vespertilionidae	*Chalinolobus nigrogriseus*	hoary wattled bat		C		6
animals	mammals	Vespertilionidae	*Chalinolobus picatus*	little pied bat		C		10
animals	mammals	Vespertilionidae	*Nyctophilus bifax*	northern long-eared bat		C		1
animals	mammals	Vespertilionidae	*Nyctophilus geoffroyi*	lesser long-eared bat		C		1
animals	mammals	Vespertilionidae	*Nyctophilus sp.*			C		2
animals	mammals	Vespertilionidae	*Scotorepens balstoni*	inland broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Scotorepens sanborni*	northern broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Scotorepens sp.*			C		2
animals	mammals	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat		C		2
animals	ray-finned fishes	Eleotridae	*Mogurnda adspersa*	southern purplespotted gudgeon				1
animals	ray-finned fishes	Melanotaeniidae	*Melanotaenia splendida splendida*	eastern rainbowfish				1

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animals	ray-finned fishes	Terapontidae	*Leiopotherapon unicolor*	spangled perch				3
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		1
animals	reptiles	Boidae	*Aspidites melanocephalus*	black-headed python		C		1
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		1
animals	reptiles	Colubridae	*Dendrelaphis punctulatus*	green tree snake		C		1
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		4
animals	reptiles	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko		C		1
animals	reptiles	Diplodactylidae	*Oedura monilis*	ocellated velvet gecko		C		2
animals	reptiles	Diplodactylidae	*Oedura monilis sensu lato*	ocellated velvet gecko		C		1
animals	reptiles	Elapidae	*Brachyurophis australis*	coral snake		C		1
animals	reptiles	Elapidae	*Demansia vestigiata*	lesser black whipsnake		C		1
animals	reptiles	Elapidae	*Denisonia maculata*	ornamental snake		V	V	4/1
animals	reptiles	Elapidae	*Furina ornata*	orange-naped snake		C		1
animals	reptiles	Gekkonidae	*Gehyra catenata*	chain-backed dtella		C		1
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		8
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		7
animals	reptiles	Pygopodidae	*Delma plebeia*	common delma		C		1
animals	reptiles	Scincidae	*Carlia munda*	shaded-litter rainbow-skink		C		1
animals	reptiles	Scincidae	*Carlia pectoralis sensu lato*			C		2
animals	reptiles	Scincidae	*Carlia rubigo*	orange-flanked rainbow skink		C		7
animals	reptiles	Scincidae	*Carlia schmeltzii*	robust rainbow-skink		C		3
animals	reptiles	Scincidae	*Carlia sp.*			C		1
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		2
animals	reptiles	Scincidae	*Cryptoblepharus metallicus*	metallic snake-eyed skink		C		1
animals	reptiles	Scincidae	*Cryptoblepharus pannosus*	ragged snake-eyed skink		C		1
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		2
animals	reptiles	Scincidae	*Cryptoblepharus virgatus sensu lato*			C		2
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		2
animals	reptiles	Scincidae	*Ctenotus taeniolatus*	copper-tailed skink		C		2
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		4
animals	reptiles	Scincidae	*Morethia boulengeri*	south-eastern morethia skink		C		4
animals	reptiles	Scincidae	*Morethia taeniopleura*	fire-tailed skink		C		3
animals	reptiles	Scincidae	*Pygmaeascincus timlowi*	dwarf litter-skink		C		9
animals	reptiles	Varanidae	*Varanus tristis*	black-tailed monitor		C		2
fungi	eurotiomycetes	Verrucariaceae	*Endocarpon pallidulum*			C		1/1
fungi	lecanoromycetes	Caliciaceae	*Buellia*					1/1
fungi	lecanoromycetes	Cladoniaceae	*Cladia muelleri*			C		1/1
fungi	lecanoromycetes	Graphidaceae	*Nadvornikia hawaiiensis*			C		1/1
fungi	lecanoromycetes	Lecanoraceae	*Lecanora*					1/1
fungi	lecanoromycetes	Lobariaceae	*Pseudocyphellaria crocata*			C		1/1
fungi	lecanoromycetes	Ochrolechiaceae	*Ochrolechia africana*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema judithae*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Parmotrema praesorediosum*			C		2/2
fungi	lecanoromycetes	Parmeliaceae	*Usnea maculata*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Usnea nidifica*			C		1/1

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fungi	lecanoromycetes	Parmeliaceae	*Usnea punctulata*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Usnea roseola*			C		1/1
fungi	lecanoromycetes	Parmeliaceae	*Usnea scabrida subsp. elegans*			C		3/3
fungi	lecanoromycetes	Parmeliaceae	*Usnea trichodeoides*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Heterodermia comosa*			C		1/1
fungi	lecanoromycetes	Physciaceae	*Physcia jackii*			C		2/2
fungi	lecanoromycetes	Ramalinaceae	*Ramalina celastri subsp. celastri*			C		1/1
fungi	lecanoromycetes	Ramalinaceae	*Ramalina inflata subsp. inflata*			C		2/2
fungi	lecanoromycetes	Teloschistaceae	*Teloschistes flavicans*			C		1/1
fungi	lecanoromycetes	Trapeliaceae	*Trapelia coarctata*			C		1/1
fungi	lichinomycetes	Lichinaceae	*Heppia lutosa*			C		1/1
plants	land plants	Acanthaceae	*Pseuderanthemum variabile*	pastel flower		C		1
plants	land plants	Acanthaceae	*Rostellularia adscendens var. clementii*			C		1/1
plants	land plants	Aizoaceae	*Trianthema triquetra*	red spinach		C		1/1
plants	land plants	Amaranthaceae	*Alternanthera nana*	hairy joyweed		C		1/1
plants	land plants	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		1
plants	land plants	Anacardiaceae	*Euroschinus falcatus*			C		3
plants	land plants	Anacardiaceae	*Pleiogynium timorense*	Burdekin plum		C		4
plants	land plants	Apocynaceae	*Alyxia ruscifolia*			C		3
plants	land plants	Apocynaceae	*Carissa ovata*	currantbush		C		3
plants	land plants	Apocynaceae	*Leichhardtia viridiflora subsp. viridiflora*			C		1/1
plants	land plants	Apocynaceae	*Marsdenia*					2
plants	land plants	Apocynaceae	*Parsonsia*					1
plants	land plants	Apocynaceae	*Parsonsia lanceolata*	northern silkpod		C		1/1
plants	land plants	Apocynaceae	*Vincetoxicum ovatum*			C		1/1
plants	land plants	Araliaceae	*Polyscias elegans*	celery wood		C		2
plants	land plants	Asteraceae	*Brachyscome*					1/1
plants	land plants	Asteraceae	*Brachyscome chrysoglossa*			C		1/1
plants	land plants	Asteraceae	*Calotis cuneata*			C		1/1
plants	land plants	Asteraceae	*Centipeda minima subsp. minima*			C		1/1
plants	land plants	Asteraceae	*Chrysocephalum apiculatum*	yellow buttons		C		2
plants	land plants	Asteraceae	*Cyanthillium cinereum*			C		3/2
plants	land plants	Asteraceae	*Lagenophora queenslandica*			C		1/1
plants	land plants	Asteraceae	*Olearia xerophila*			C		1
plants	land plants	Asteraceae	*Ozothamnus cassinioides*			C		1/1
plants	land plants	Asteraceae	*Peripleura hispidula var. setosa*			C		1/1
plants	land plants	Asteraceae	*Senecio brigalowensis*			C		1/1
plants	land plants	Asteraceae	*Vittadinia pustulata*			C		1/1
plants	land plants	Bombacaceae	*Lagunaria queenslandica*			C		2/2
plants	land plants	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		1
plants	land plants	Byttneriaceae	*Waltheria indica*			C		1
plants	land plants	Campanulaceae	*Lobelia concolor*			SL		2/2
plants	land plants	Campanulaceae	*Wahlenbergia capillaris*			SL		1/1
plants	land plants	Cannabaceae	*Trema tomentosa*			C		1
plants	land plants	Capparaceae	*Capparis canescens*			C		1
plants	land plants	Caryophyllaceae	*Polycarpaea corymbosa var. minor*			C		2/2

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plants	land plants	Casuarinaceae	*Casuarina cristata*	belah		C		1/1
plants	land plants	Casuarinaceae	*Casuarina cunninghamiana*			C		1
plants	land plants	Celastraceae	*Denhamia disperma*			C		3
plants	land plants	Chenopodiaceae	*Atriplex*					1
plants	land plants	Chenopodiaceae	*Einadia nutans subsp. linifolia*			C		2/2
plants	land plants	Chenopodiaceae	*Salsola australis*			C		1/1
plants	land plants	Commelinaceae	*Aneilema acuminatum*			C		1/1
plants	land plants	Commelinaceae	*Murdannia graminea*	murdannia		C		2/2
plants	land plants	Convolvulaceae	*Jacquemontia paniculata var. tomentosa*			C		1/1
plants	land plants	Convolvulaceae	*Polymeria longifolia*	polymeria		C		1/1
plants	land plants	Convolvulaceae	*Polymeria pusilla*			C		1/1
plants	land plants	Cucurbitaceae	*Cucumis althaeoides*			C		1/1
plants	land plants	Cyperaceae	*Abildgaardia ovata*			C		1
plants	land plants	Cyperaceae	*Cyperus*					2
plants	land plants	Cyperaceae	*Cyperus concinnus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus difformis*	rice sedge		C		1/1
plants	land plants	Cyperaceae	*Cyperus iria*			C		1/1
plants	land plants	Dioscoreaceae	*Dioscorea transversa*	native yam		C		3/1
plants	land plants	Ebenaceae	*Diospyros geminata*	scaly ebony		C		5
plants	land plants	Ebenaceae	*Diospyros humilis*	small-leaved ebony		C		1
plants	land plants	Euphorbiaceae	*Adriana tomentosa var. tomentosa*			C		3/2
plants	land plants	Euphorbiaceae	*Croton arnhemicus*			C		2
plants	land plants	Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton		C		1
plants	land plants	Euphorbiaceae	*Euphorbia bifida*			C		1/1
plants	land plants	Goodeniaceae	*Goodenia byrnesii*			C		1/1
plants	land plants	Goodeniaceae	*Goodenia hirsuta*			C		1/1
plants	land plants	Hemerocallidaceae	*Dianella*					3
plants	land plants	Hernandiaceae	*Gyrocarpus americanus*			C		1
plants	land plants	Hernandiaceae	*Gyrocarpus americanus subsp. americanus*			C		1/1
plants	land plants	Hypoxidaceae	*Hypoxis arillacea*			C		1/1
plants	land plants	Juncaceae	*Juncus aridicola*	tussock rush		C		1/1
plants	land plants	Lamiaceae	*Coleus diversus*			C		1/1
plants	land plants	Lamiaceae	*Glossocarya hemiderma*			C		1/1
plants	land plants	Lamiaceae	*Plectranthus*					4
plants	land plants	Lamiaceae	*Premna dallachyana*			C		1/1
plants	land plants	Lamiaceae	*Vitex melicopea*			C		1
plants	land plants	Laxmanniaceae	*Eustrephus latifolius*	wombat berry		C		4
plants	land plants	Laxmanniaceae	*Lomandra*					1
plants	land plants	Laxmanniaceae	*Lomandra filiformis*			C		3
plants	land plants	Laxmanniaceae	*Lomandra filiformis subsp. filiformis*			C		1/1
plants	land plants	Laxmanniaceae	*Lomandra longifolia*			C		2
plants	land plants	Leguminosae	*Acacia*					1
plants	land plants	Leguminosae	*Acacia disparrima subsp. disparrima*			C		1
plants	land plants	Leguminosae	*Acacia rhodoxylon*	ringy rosewood		C		2
plants	land plants	Leguminosae	*Cassia brewsteri*			C		2/1
plants	land plants	Leguminosae	*Chamaecrista absus*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Leguminosae	*Chamaecrista nomame*			C		1/1
plants	land plants	Leguminosae	*Cullen tenax*	emu-foot		C		1/1
plants	land plants	Leguminosae	*Desmodium macrocarpum*			C		1/1
plants	land plants	Leguminosae	*Erythrina vespertilio*			C		2
plants	land plants	Leguminosae	*Galactia tenuiflora var. lucida*			C		1/1
plants	land plants	Leguminosae	*Indigofera linifolia*			C		1/1
plants	land plants	Leguminosae	*Indigofera linnaei*	Birdsville indigo		C		1/1
plants	land plants	Leguminosae	*Indigofera pratensis*			C		2/1
plants	land plants	Leguminosae	*Lotus australis*	Australian trefoil		C		1/1
plants	land plants	Leguminosae	*Lysiphyllum hookeri*	Queensland ebony		C		3/3
plants	land plants	Leguminosae	*Rhynchosia minima var. australis*			C		1/1
plants	land plants	Leguminosae	*Tephrosia filipes var. (Mt Blackjack A.R.Bean+ 7332)*			C		1/1
plants	land plants	Leguminosae	*Vachellia bidwillii*			C		1/1
plants	land plants	Loganiaceae	*Strychnos psilosperma*	strychnine tree		C		3
plants	land plants	Malvaceae	*Abutilon oxycarpum var. incanum*			C		1/1
plants	land plants	Malvaceae	*Hibiscus verdcourtii*			C		1/1
plants	land plants	Malvaceae	*Sida fibulifera*			C		1/1
plants	land plants	Malvaceae	*Sida hackettiana*			C		1
plants	land plants	Menispermaceae	*Tinospora smilacina*	snakevine		C		1
plants	land plants	Moraceae	*Ficus opposita*			C		2
plants	land plants	Moraceae	*Ficus rubiginosa forma rubiginosa*			C		2
plants	land plants	Moraceae	*Ficus virens*			C		1
plants	land plants	Myrsinaceae	*Myrsine variabilis*			C		4/1
plants	land plants	Myrtaceae	*Backhousia angustifolia*	narrow-leaved backhousia		C		1
plants	land plants	Myrtaceae	*Corymbia clarksoniana*			C		1
plants	land plants	Myrtaceae	*Corymbia dallachiana*			C		2
plants	land plants	Myrtaceae	*Corymbia erythrophloia*	variable-barked bloodwood		C		4
plants	land plants	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		3
plants	land plants	Myrtaceae	*Eucalyptus drepanophylla*			C		5
plants	land plants	Myrtaceae	*Eucalyptus platyphylla*	poplar gum		C		2
plants	land plants	Myrtaceae	*Eucalyptus platyphylla x Eucalyptus tereticornis*			C		1
plants	land plants	Myrtaceae	*Eucalyptus raveretiana*	black ironbox		C	V	18/2
plants	land plants	Myrtaceae	*Eucalyptus tereticornis*			C		2
plants	land plants	Myrtaceae	*Melaleuca*					1
plants	land plants	Myrtaceae	*Melaleuca bracteata*			C		2
plants	land plants	Myrtaceae	*Melaleuca fluviatilis*			C		1
plants	land plants	Myrtaceae	*Melaleuca linariifolia*	snow-in summer		C		1
plants	land plants	Nyctaginaceae	*Boerhavia sp. (St George A.Hill AQ399299)*			C		1/1
plants	land plants	Oleaceae	*Jasminum didymum*			C		1
plants	land plants	Oleaceae	*Jasminum didymum subsp. lineare*			C		1/1
plants	land plants	Oleaceae	*Jasminum simplicifolium*			C		2
plants	land plants	Oleaceae	*Notelaea microcarpa*			C		2
plants	land plants	Orchidaceae	*Cymbidium canaliculatum*			SL		1
plants	land plants	Orchidaceae	*Dipodium elegantulum*			SL		1/1
plants	land plants	Phyllanthaceae	*Breynia oblongifolia*			C		5

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Phyllanthaceae	*Bridelia leichhardtii*			C		2
plants	land plants	Phyllanthaceae	*Flueggea virosa subsp. melanthesoides*			C		1
plants	land plants	Phyllanthaceae	*Glochidion*					1
plants	land plants	Phyllanthaceae	*Glochidion apodogynum*			C		1/1
plants	land plants	Phyllanthaceae	*Phyllanthus maderaspatensis*			C		1/1
plants	land plants	Phyllanthaceae	*Phyllanthus virgatus*			C		1
plants	land plants	Picrodendraceae	*Petalostigma pubescens*	quinine tree		C		3
plants	land plants	Pittosporaceae	*Bursaria incana*			C		1
plants	land plants	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		1
plants	land plants	Poaceae	*Aristida*					5
plants	land plants	Poaceae	*Aristida gracilipes*			C		1/1
plants	land plants	Poaceae	*Aristida lazaridis*			C		1/1
plants	land plants	Poaceae	*Bothriochloa bladhii subsp. bladhii*			C		1/1
plants	land plants	Poaceae	*Bothriochloa erianthoides*	satintop grass		C		1/1
plants	land plants	Poaceae	*Chloris divaricata var. divaricata*	slender chloris		C		1/1
plants	land plants	Poaceae	*Chloris ventricosa*	tall chloris		C		1/1
plants	land plants	Poaceae	*Chrysopogon fallax*			C		1/1
plants	land plants	Poaceae	*Cymbopogon obtectus*			C		1
plants	land plants	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		5
plants	land plants	Poaceae	*Dichanthium fecundum*	curly bluegrass		C		2/2
plants	land plants	Poaceae	*Dichanthium setosum*			C	V	1/1
plants	land plants	Poaceae	*Digitaria hystrichoides*	umbrella grass		C		1/1
plants	land plants	Poaceae	*Enneapogon*					2
plants	land plants	Poaceae	*Eragrostis*					1
plants	land plants	Poaceae	*Eragrostis tenellula*	delicate lovegrass		C		1/1
plants	land plants	Poaceae	*Eulalia aurea*	silky browntop		C		2
plants	land plants	Poaceae	*Heteropogon contortus*	black speargrass		C		3
plants	land plants	Poaceae	*Heteropogon triticeus*	giant speargrass		C		2
plants	land plants	Poaceae	*Holcolemma dispar*			C		1/1
plants	land plants	Poaceae	*Mnesithea rottboellioides*			C		1/1
plants	land plants	Poaceae	*Panicum*					3
plants	land plants	Poaceae	*Panicum effusum*			C		2/2
plants	land plants	Poaceae	*Panicum trichoides*			C		1/1
plants	land plants	Poaceae	*Pseudoraphis spinescens*	spiny mudgrass		C		1/1
plants	land plants	Poaceae	*Sporobolus scabridus*			C		1/1
plants	land plants	Poaceae	*Themeda*					1
plants	land plants	Poaceae	*Themeda triandra*	kangaroo grass		C		3
plants	land plants	Poaceae	*Urochloa gilesii var. gilesii*			C		1/1
plants	land plants	Polygonaceae	*Persicaria attenuata*			C		1/1
plants	land plants	Polygonaceae	*Persicaria lapathifolia*	pale knotweed		C		1/1
plants	land plants	Polypodiaceae	*Drynaria rigidula*			SL		1
plants	land plants	Polypodiaceae	*Platycerium*					1
plants	land plants	Polypodiaceae	*Platycerium veitchii*	silver elkhorn		SL		1
plants	land plants	Proteaceae	*Persoonia falcata*			C		1
plants	land plants	Pteridaceae	*Adiantum hispidulum*			SL		1
plants	land plants	Pteridaceae	*Cheilanthes*					1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Putranjivaceae	*Drypetes deplanchei*	grey boxwood		C		6
plants	land plants	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		4
plants	land plants	Rubiaceae	*Dolichocarpa coerulescens*			C		2/2
plants	land plants	Rubiaceae	*Pavetta australiensis*			C		1
plants	land plants	Rubiaceae	*Pavetta australiensis var. australiensis*			C		1/1
plants	land plants	Rubiaceae	*Psydrax odorata*			C		2
plants	land plants	Rubiaceae	*Spermacoce brachystema*			C		1/1
plants	land plants	Rubiaceae	*Triflorensia ixoroides*			C		1/1
plants	land plants	Rutaceae	*Acronychia laevis*	glossy acronychia		C		1
plants	land plants	Rutaceae	*Dinosperma erythrococcum*			C		1/1
plants	land plants	Rutaceae	*Flindersia australis*	crow's ash		C		3
plants	land plants	Rutaceae	*Geijera salicifolia*	brush wilga		C		3
plants	land plants	Sapindaceae	*Alectryon connatus*	grey birds-eye		C		6/1
plants	land plants	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		1
plants	land plants	Sapindaceae	*Atalaya*					1
plants	land plants	Sapindaceae	*Atalaya hemiglauca*			C		1/1
plants	land plants	Sapindaceae	*Cupaniopsis anacardioides*	tuckeroo		C		1
plants	land plants	Sapindaceae	*Dodonaea viscosa*			C		2
plants	land plants	Sapindaceae	*Dodonaea viscosa subsp. burmanniana*			C		1/1
plants	land plants	Sapotaceae	*Planchonella pohlmaniana*			C		1
plants	land plants	Scrophulariaceae	*Eremophila debilis*	winter apple		C		2/2
plants	land plants	Smilacaceae	*Smilax*					1
plants	land plants	Smilacaceae	*Smilax calophylla*			C		1/1
plants	land plants	Solanaceae	*Lycianthes shanesii*			C		1/1
plants	land plants	Solanaceae	*Solanum*					1
plants	land plants	Solanaceae	*Solanum ellipticum*	potato bush		C		1/1
plants	land plants	Solanaceae	*Solanum esuriale*	quena		C		1/1
plants	land plants	Sparrmanniaceae	*Grewia latifolia*	dysentery plant		C		1
plants	land plants	Sparrmanniaceae	*Grewia savannicola*			C		3
plants	land plants	Sparrmanniaceae	*Grewia scabrella*			C		1
plants	land plants	Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree		SL		5
plants	land plants	Violaceae	*Pigea enneasperma*			C		1/1
plants	land plants	Vitaceae	*Cissus cardiophylla*			C		1/1
plants	land plants	Vitaceae	*Cissus oblonga*			C		2
plants	land plants	Vitaceae	*Cissus repens*			C		3
plants	land plants	Vitaceae	*Tetrastigma nitens*	shining grape		C		1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix A3 Ground-truthed Regional Ecosystems

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

HAIL CREEK

MAJOR EA AMENDMENT

GROUND-TRUTHED VEGETATION

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease

Ground-truthed Regional Ecosystems

- Endangered
- Of concern
- Least concern

Inset A
Scale: 1:50,000

Inset B
Scale: 1:35,000

SEE INSET A

SEE INSET B

Area 1

Area 2

Area 3

Area 4

ML 700026

ML 4738

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	13-Mar-2025
Drawn by:	AS

SLR

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Appendix A4 Ground-truthed Of Concern and Endangered Regional Ecosystems

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

ML 700026

ML 4738

Inset A
Scale: 1:30,000

Area 1
Area 2
Area 3
11.3.4
11.4.2
11.9.7

Inset B
Scale: 1:35,000

Area 4
11.3.4
11.9.4
11.9.7
11.3.2

HAIL CREEK

MAJOR EA AMENDMENT

REGULATED VEGETATION UNDER THE VM ACT OF CONCERN REGIONAL ECOSYSTEMS

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease

Ground-truthed Regional Ecosystems

- Of concern

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	13-Mar-2025
Drawn by:	AS

SLR

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Appendix A5 Ornamental Snake habitat

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

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7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

ML 700026

ML 4738

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

HAIL CREEK

MAJOR EA AMENDMENT

ORNAMENTAL SNAKE HABITAT

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease
- High-quality Ornamental Snake Habitat
- Marginal-quality Ornamental Snake Habitat

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	14-Mar-2025
Drawn by:	AS

SLR

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Appendix A6 Regulated Vegetation: Vegetation associated with a watercourse

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

ML 700026

ML 4738

Inset A *Scale: 1:30,000*

11.3.4
11.9.9
Area 1
Area 2
11.3.25a
11.3.4
11.3.25/
11.3.4 (90/10)
11.9.9
Area 1
11.3.25a
Area 3
11.9.9
11.3.4
11.4.2
11.3.4
11.9.7

Inset B *Scale: 1:35,000*

11.9.2
11.9.9
11.3.4
11.9.4
11.9.4
11.9.2
11.9.4
11.9.7
Area 4
11.9.2

HAIL CREEK

MAJOR EA AMENDMENT

REGULATED VEGETATION

VEGETATION ASSOCIATED WITH A WATERCOURSE

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease

Ground-truthed Regional Ecosystem

- Endangered
- Least concern
- Of concern

Watercourse Buffer Zones

- Vegetation Management Watercourse within Proposed EA Amendment Areas (25m buffer)
- Vegetation Management Watercourse within Proposed EA Amendment Areas (50m buffer)

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	13-Mar-2025
Drawn by:	AS

SLR

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Appendix A7 Wetland and watercourses

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

HAIL CREEK

MAJOR EA AMENDMENT

MSES WETLAND VALUES

LEGEND

- Mining Lease
- Study Area
- MSES Protected Area (Estates)
- MSES Declared High Ecological Value Waters (Watercourse)
- MSES Declared High Ecological Value Waters (Wetland)

Area 1
Area 2
Area 3
Area 1
Area 4
Homevale National Park
Homevale Resources Reserve
ML 700026
ML 4738

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	19-Mar-2025
Drawn by:	AS

SLR

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Appendix A8 Waterways that provide fish passage

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

HAIL CREEK

MAJOR EA AMENDMENT

WATERWAYS THAT PROVIDE FISH PASSAGE

LEGEND

- Mining Lease
- Study Area
- MSES Protected Area (Estates)

Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major

Area 1
Area 2
Area 3
Area 4
Homevale National Park
Homevale Resources Reserve
ML 700026
ML 4738

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	19-Mar-2025
Drawn by:	AS

SLR

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Appendix A9 Koala and Squatter Pigeon (southern) habitat

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

HAIL CREEK

MAJOR EA AMENDMENT

KOALA AND SQUATTER PIGEON HABITAT

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

ML 700026

ML 4738

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease
- Koala and Squatter Pigeon Habitat

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	14-Mar-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Ecological Assessment Report\SLR626301 28 Hail Creek Major EA Amendment - Koala And Squatter Pigeon Habitat.mxd

Appendix A10 Glossy Black-Cockatoo habitat

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

HAIL CREEK

MAJOR EA AMENDMENT

GLOSSY BLACK COCKATOO HABITAT

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease
- Glossy Black Cockatoo Habitat

SEE INSET A

Inset A
Scale: 1:30,000

SEE INSET B

Inset B
Scale: 1:35,000

ML 700026

ML 4738

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	14-Mar-2025
Drawn by:	AS

SLR

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Appendix A11 Black Ironbox habitat

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

Area 1

Area 2

Area 3

Area 1

Inset A
Scale: 1:20,000

Area 2

Area 1

Area 3

Area 1

ML 700026

Proposed Haul Road

Area 4

ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

BLACK IRONBOX HABITAT

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease
- Offset Area

Ground-truthed Black Ironbox Habitat

- Mapped by Eco SM

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	13-Mar-2025
Drawn by:	AS

SLR

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Appendix A12 Southern and Central Greater Glider habitat

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

SEE INSET B

ML 700026

ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

CENTRAL GREATER GLIDER HABITAT

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease
- Central Greater Glider Habitat

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	19-Sep-2025
Drawn by:	AS

SLR

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Appendix A13 Threatened ecological communities

Hail Creek Open Cut Eastern Margin Extension

Eastern Margin Expansion Project: Terrestrial and Aquatic Ecological Assessment Report

Hail Creek Coal Holdings Pty Ltd

SLR Project No.: 626.30128.00000

26 November 2025

650000
651000
652000
7621000
7620000
7619000

11.9.4
11.9.4
Area 4
ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

THREATENED ECOLOGICAL COMMUNITIES

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease

Threatened Ecological Communities

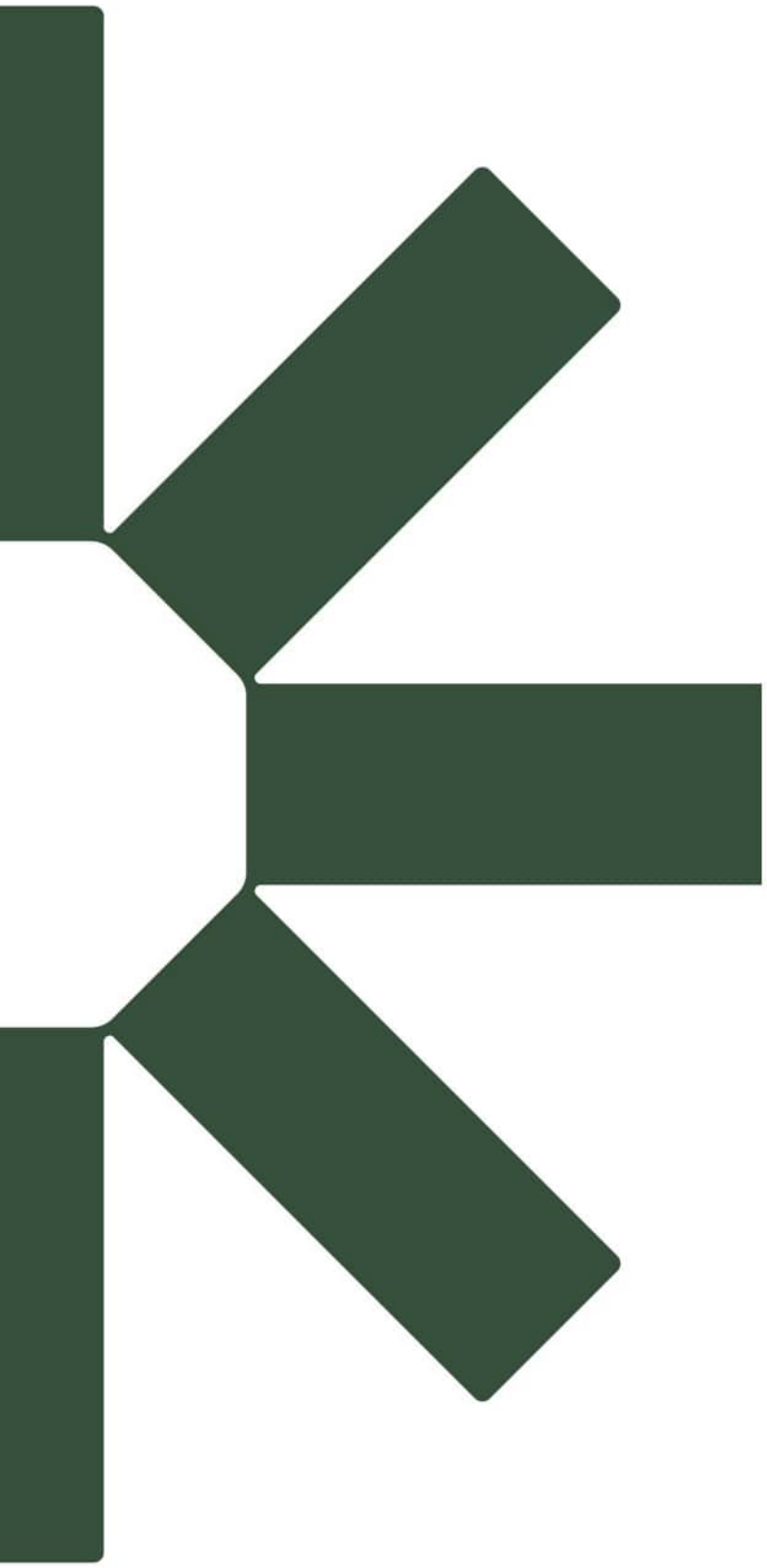
- Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar bioregions

0 100 200 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:10,000 at A3
Project Number:	626.30128
Date:	13-Mar-2025
Drawn by:	AS

SLR

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Making Sustainability Happen

Appendix B Maps

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

SLR Project No.: 626.30128.00000

17 December 2025

HAIL CREEK

MAJOR EA AMENDMENT

GROUND-TRUTHED VEGETATION

LEGEND

Vegetation Management Watercourse

Study Area

Mining Lease

Ground-truthed Regional Ecosystems

- Endangered
- Of concern
- Least concern
- Non-Remnant

Inset A *Scale: 1:50,000*

Inset B *Scale: 1:35,000*

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	12-Nov-2025
Drawn by:	AS

SLR

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HAIL CREEK

MAJOR EA AMENDMENT

BIOCONDITION ASSESSMENTS

SEE INSET A

SEE INSET B

Inset A
Scale: 1:50,000

Inset B
Scale: 1:35,000

Area 1
Area 2
Area 3
Area 4

ML 700026
ML 4738

LEGEND

- Biocondition Assessment
- Vegetation Management Watercourse
- Study Area
- Mining Lease

Ground-truthed Regional Ecosystems

- Endangered
- Of concern
- Least concern

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	12-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR62630128 Hail Creek Major EA Amendment - BioCondition Assessments.mxd

HAIL CREEK

MAJOR EA AMENDMENT

HABITAT CONDITION ASSESSMENTS

SEE INSET A

SEE INSET B

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

Area 1
Area 2
Area 3
Area 4

ML 700026
ML 4738

LEGEND

- Habitat Condition Assessment
- Vegetation Management Watercourse
- Study Area
- Mining Lease

Ground-truthed Regional Ecosystems

- Endangered
- Of concern
- Least concern

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	12-Nov-2025
Drawn by:	AS

SLR

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637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

ML 700026

ML 4738

Inset A
Scale: 1:30,000

Area 1
Area 2
Area 3
11.3.4
11.4.2
11.9.7

Inset B
Scale: 1:35,000

Area 4
11.3.4
11.9.4
11.9.7
11.3.2

HAIL CREEK

MAJOR EA AMENDMENT

REGULATED VEGETATION UNDER THE VM ACT OF CONCERN REGIONAL ECOSYSTEMS

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease

Ground-truthed Regional Ecosystems

- Of concern

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	25-Nov-2025
Drawn by:	AS

SLR

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HAIL CREEK

MAJOR EA AMENDMENT

REGULATED VEGETATION

VEGETATION ASSOCIATED WITH A WATERCOURSE

LEGEND

- Vegetation Management Watercourse
- Proposed EA Amendment Area
- Mining Lease

Ground-truthed Regional Ecosystem

- Endangered
- Least concern
- Of concern

Watercourse Buffer Zones

- Vegetation Management Watercourse within Proposed EA Amendment Areas (25m buffer)
- Vegetation Management Watercourse within Proposed EA Amendment Areas (50m buffer)

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	14-Mar-2025
Drawn by:	AS

SLR

638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

ML 700026

ML 4738

Inset A
Scale: 1:30,000

11.3.4
11.9.9
Area 1
Area 2
11.3.25a
11.3.4
11.3.25/
11.3.4 (90/10)
11.9.9
Area 1
11.3.25a
Area 3
11.9.9
11.3.4
11.4.2
11.3.4
11.9.7

Inset B
Scale: 1:35,000

11.9.2
11.9.9
11.3.4
11.9.4
11.9.4
11.9.2
11.9.4
11.9.7
Area 4
11.9.2

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650000
651000
652000
7621000
7620000
7619000

11.9.4
11.9.4
11.9.5
11.9.4
Area 4
ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

THREATENED ECOLOGICAL COMMUNITIES

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease

Threatened Ecological Communities

- Semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar bioregions
- Brigalow *(Acacia harpophylla dominant and co-dominant)*

N

0 100 200 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:10,000 at A3
Project Number:	626.30128
Date:	18-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR62630128 Hail Creek Major EA Amendment - Threathened Ecological Communities.mxd

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7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

Area 1

Area 2

Area 3

Area 1

ML700026

Area 4

ML4738

Inset A
Scale: 1:20,000

Area 2

Area 1

Area 3

Area 1

HAIL CREEK

MAJOR EA AMENDMENT

BLACK IRONBOX HABITAT

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease
- Offset Area

Ground-truthed Black Ironbox Habitat

- Mapped by Eco SM
- Mapped by SLR (2023)

N

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	17-Nov-2025
Drawn by:	AS

SLR

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HAIL CREEK

MAJOR EA AMENDMENT

GLOSSY BLACK COCKATOO HABITAT

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease
- Low Quality Glossy Black Cockatoo Habitat

Conservation Significant Fauna Species Records

- Glossy Black-cockatoo

SEE INSET A

SEE INSET B

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

ML 700026

ML 4738

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	17-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR62630128 Hail Creek Major EA Amendment - Glossy Black Cockatoo Habitat.mxd

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

SEE INSET B

ML700026

ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

KOALA AND SQUATTER PIGEON HABITAT

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease
- High Quality Koala and Squatter Pigeon Habitat

Conservation Significant Fauna Species Records

- Koala
- Squatter Pigeon

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	17-Nov-2025
Drawn by:	AS

SLR

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HAIL CREEK

MAJOR EA AMENDMENT

CENTRAL GREATER GLIDER HABITAT

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

SEE INSET B

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

ML700026

ML 4738

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease
- High Quality Central Greater Glider Habitat
- Low Quality Central Greater Glider Habitat

Conservation Significant Fauna Species Records

- Central Greater Glider

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	18-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR626630128 Hail Creek Major EA Amendment - Central Greater Glider Habitat.mxd

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

SEE INSET B

ML 700026

ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

ORNAMENTAL SNAKE HABITAT

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease
- High Quality Ornamental Snake Habitat
- Low Quality Ornamental Snake Habitat

Conservation Significant Fauna Species Records

- Ornamental Snake

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	18-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR626301 28 Hail Creek Major EA Amendment - Ornamental Snake Habitat.mxd

637000 638000 639000 640000 641000 642000 643000 644000 645000 646000 647000 648000 649000 650000 651000 652000 653000 654000 655000 656000 657000 658000

7632000 7631000 7630000 7629000 7628000 7627000 7626000 7625000 7624000 7623000 7622000 7621000 7620000 7619000 7618000 7617000 7616000

SEE INSET A

Inset A
Scale: 1:30,000

Inset B
Scale: 1:35,000

SEE INSET B

ML-700026

ML 4738

HAIL CREEK

MAJOR EA AMENDMENT

WHITE-THROATED NEEDLETAIL RECORDS AND SHORT-BEAKED ECHIDNA HABITAT

LEGEND

- Vegetation Management Watercourse
- Study Area
- Mining Lease
- Short-beaked Echidna Habitat

Conservation Significant Fauna Species Records

- Short-beaked Echidna
- White-throated Needletail

N

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	17-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR626301 28 Hail Creek Major EA Amendment - White-throated Needletail and Short-beaked Echidna Habitat.mxd

HAIL CREEK

MAJOR EA AMENDMENT

OFFSET AREAS

LEGEND

- Brumby Waterhole
- Study Area
- Mining Lease
- Homevale National Park
- Black Ironbox Offset Area
- 2015 Offset Area

Biodiversity Corridor

- Terrestrial
- Riparian/Terrestrial

ML 700026

ML 4738

0 0.5 1 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:60,000 at A3
Project Number:	626.30128
Date:	18-Nov-2025
Drawn by:	AS

SLR

H:\Projects-SLR\626-MKY\626.30128.00000 Hail Creek Major EA Amendment\06 SLR Data\01 CADGIS\GIS\Impact Assessment Report\SLR62630128 Hail Creek Major EA Amendment - Offset Areas.mxd

Appendix C BioCondition Assessment Locations and Scores

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

SLR Project No.: 626.30128.00000

17 December 2025

Table C-1 BioCondition transects (GDA94 55K)

Vegetation Community	Site Name	Easting	Northing	Orientation
RE 11.9.7	BioCondition site 1	-21.4990	148.4227	298°
RE 11.3.25	BioCondition site 2	-21.4975	148.4187	183°
RE 11.9.7	BioCondition site 3	-21.4958	148.4110	180°
RE 11.9.9	BioCondition site 4	-21.4167	148.3858	84°
RE 11.3.25	BioCondition site 5	-21.4196	148.3880	199°
RE 11.3.4	BioCondition site 6	-21.4140	148.3797	188°
RE 11.3.4	BioCondition site 7	-21.4231	148.3852	16°
RE 11.4.2	BioCondition site 8	-21.4232	148.3964	132°
RE 11.9.9	BioCondition site 9	-21.4256	148.3999	140°
RE 11.4.2	BioCondition site 10	-21.4280	148.3905	274°
RE 11.9.2	BioCondition site 11	-21.5176	148.4629	357°
RE 11.9.2	BioCondition site 12	-21.5073	148.4473	67°
RE 11.3.4	BioCondition site 13	-21.5098	148.4500	42°
RE 11.9.7	BioCondition site 14	-21.5134	148.4496	214°
RE 11.9.2	BioCondition site 15	-21.5133	148.4528	17°
RE 11.9.7	BioCondition site 16	-21.5211	148.4545	130°
RE 11.9.4	BioCondition site 17	-21.5125	148.4600	344°
RE 11.9.4	BioCondition site 18	-21.5161	148.4668	126°
RE 11.9.4	BioCondition site 20	-21.5151	148.4655	311°
RE 11.9.7	BioCondition site 21	-21.5258	148.4600	3°
RE 11.9.2	BioCondition site 22	-21.5212	148.4492	335°
RE 11.9.2	BioCondition site 23	-21.5236	148.4666	293°
RE 11.9.9	BioCondition site 24	-21.5072	148.4540	306°
RE 11.3.4	BioCondition site 25	-21.5078	148.4512	213°
RE 11.9.7	BioCondition site 26	-21.5093	148.4522	337°
RE 11.9.9	BioCondition site 27	-21.4133	148.3832	63°
RE 11.9.9	BioCondition site 28	-21.4180	148.3831	111°
RE 11.3.25	BioCondition site 29	-21.4188	148.3733	324°
RE 11.3.4	BioCondition site 30	-21.4255	148.3766	200°

Table C-2 Benchmark values, raw values and Biocondition scores for sites within RE 11.3.4

RE 11.3.4	BioCondition Benchmark	Site 1 BioCondition Site 6		Site 2 BioCondition Site 7		Site 3 BioCondition Site 13		Site 4 BioCondition Site 25		Site 5 BioCondition Site 30	
	RE 11.3.4	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Recruitment of woody perennial species (%)	100	60	3	60	3	75	3	40	3	83	5
Native tree species richness	4	5	5	5	5	4	5	5	5	6	5
Native shrub species richness	2	15	5	8	5	13	5	11	5	15	5
Native grass species richness	7	1	0	9	5	2	2.5	5	2.5	8	5
Native forb species richness	10	6	2.5	17	5	6	2.5	9	5	16	5
Tree canopy median height (m)	22	17	5	15	5	20	5	19	5	19	5
Tree sub-canopy median height (m)	12	10		10		8		8		11	
Tree canopy cover (%)	17	74	3	43	3	70	3	58	3	48	3

RE 11.3.4	BioCondition Benchmark	Site 1 BioCondition Site 6		Site 2 BioCondition Site 7		Site 3 BioCondition Site 13		Site 4 BioCondition Site 25		Site 5 BioCondition Site 30	
	RE 11.3.4	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Tree sub-canopy cover (%)	5	30		11		63		36		43	
Shrub canopy cover (%)	1	2	5	2	5	7	3	21	3	11	3
Native perennial grass cover (%)	43	0	0	83	5	0	0	8	1	55	5
Organic litter cover (%)	20	31	5	11	5	59	3	29	5	12	5
Number of large eucalypts (dbh of ≥48cm) per ha Number of large non-eucalypts (dbh of ≥24cm) per ha	26 9	0 22	10	2 20	10	14 10	10	14 0	5	8 0	5
CWD (per ha)	384	280	5	140	2	810	2	100	2	330	5
Weed Cover (%)	0	35	3	2	10	36	3	80	0	30	3
Sum of Scores	**-**	**-**	**51.5**	**-**	**68**	**-**	**47**	**-**	**49.5**	**-**	**59**

RE 11.3.4	BioCondition Benchmark	Site 1 BioCondition Site 6		Site 2 BioCondition Site 7		Site 3 BioCondition Site 13		Site 4 BioCondition Site 25		Site 5 BioCondition Site 30	
	RE 11.3.4	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Average BioCondition Score (out of 80)	**RE 11.3.4 – 55/80 = 69**										
BioCondition Score out of 10	**7**										

Table C-3 Benchmark values, raw values and BioCondition scores for sites within RE 11.3.25a

RE 11.3.25a	BioCondition Benchmark	Site 1 BioCondition Site 2		Site 2 BioCondition Site 5		Site 3 BioCondition Site 29	
	RE 11.3.25a	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Recruitment of woody perennial species (%)	100	43	3	25	3	57	3
Native tree species richness	4	7	5	8	5	7	5
Native shrub species richness	4	10	5	14	5	10	5
Native grass species richness	8	2	2.5	4	2.5	0	0
Native forb species richness	13	11	2.5	5	2.5	5	2.5
Tree canopy median height (m)	23	18	5	17	5	24	5
Tree sub-canopy median height (m)	11	9		9		15	
Tree canopy cover (%)	34	68	4	66	4	72	3
Tree sub-canopy cover (%)	12	39		32		59	
Shrub canopy cover (%)	7	4	5	8	5	31	3
Native perennial grass cover (%)	35	5	1	0	0	0	0
Organic litter cover (%)	21	30	5	50	3	20	5
Number of large eucalypts (dbh of ≥53cm) per ha	19	18	10	0	10	4	15
Number of large non-eucalypts (dbh of ≥26cm) per ha	13	14		26		28	
CWD (per ha)	473	410	5	260	5	330	5
Weed Cover (%)	0	33	3	24	5	40	3
Sum of Scores	**-**	**-**	**56**	**-**	**55**	**-**	**54.5**
Average BioCondition Score (out of 80)	**RE 11.3.25 – 55.2/80 = 69**						
BioCondition Score out of 10	**7**						

Table C-4 Benchmark values, raw values and Biocondition scores for sites within RE 11.4.2

RE 11.4.2	BioCondition Benchmark	Site 1 BioCondition Site 8		Site 2 BioCondition Site 10	
	RE 11.4.2	Raw values	BioCondition Score	Raw values	BioCondition Score
Recruitment of woody perennial species (%)	100	80	5	100	5
Native tree species richness Native shrub species richness Native grass species richness Native forb species richness	4 5 8 7	5 10 8 15	5 5 5 5	2 4 12 24	2.5 2.5 5 5
Tree canopy median height (m)	20	16	5	17	5
Tree sub-canopy median height (m)	8	9		8	
Tree canopy cover (%)	25	15	4	35	4
Tree sub-canopy cover (%)	5	24		22	
Shrub canopy cover (%)	13	2.5	3	1	3
Native perennial grass cover (%)	16	44	5	27	5
Organic litter cover (%)	30	32	5	37	5
Number of large Eucalypts (dbh of ≥39cm) per ha Number of large non-eucalypts (dbh of ≥24cm) per ha	9 9	18 16	15	4 20	15
CWD (per ha)	109	540	2	190	5
Weed Cover (%)	0	5	5	10	5
Sum of Scores	**-**	**-**	**69**	**-**	**67**
Average BioCondition Score (out of 80)	**RE 11.4.2 – 68/80 = 85**				
BioCondition Score out of 10	**9**				

Table C-5 Benchmark values, raw values and Biocondition scores for sites within RE 11.9.2

RE 11.9.2	BioCondition Benchmark	Site 1 BioCondition Site 11		Site 2 BioCondition Site 12		Site 3 BioCondition Site 15		Site 4 BioCondition Site 22		Site 5 BioCondition Site 23	
	RE 11.9.2	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Recruitment of woody perennial species (%)	100	75	3	25	3	75	5	50	3	100	5
Native tree species richness	2	4	5	4	5	8	5	4	5	3	5
Native shrub species richness	10	7	2.5	10	5	11	5	12	5	11	5
Native grass species richness	7	7	5	9	5	7	5	9	5	10	5
Native forb species richness	12	26	5	26	5	17	5	21	5	23	5
Tree canopy median height (m)	15	18	5	19	5	17	5	13	5	14	5
Tree canopy median height (m)	6	10		12		5		6		6	
Tree canopy cover (%)	25	31	4	22	4	34	4	50	2.5	20	4

RE 11.9.2	BioCondition Benchmark	Site 1 BioCondition Site 11		Site 2 BioCondition Site 12		Site 3 BioCondition Site 15		Site 4 BioCondition Site 22		Site 5 BioCondition Site 23	
	RE 11.9.2	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Tree sub-canopy cover (%)	3	10		19		8		0		7.5	
Shrub canopy cover (%)	25	4	3	10	3	6	3	6	3	7	3
Native perennial grass cover (%)	18	5	1	7	1	10	3	45	5	68	5
Organic litter cover (%)	30	13	3	13	3	10	3	19	5	11	3
Number of large Eucalypts (dbh of ≥47cm) per ha Number of large non-eucalypts (dbh N/A) per ha	13 N/A	6 N/A	5	8 N/A	10	14 N/A	15	8 N/A	10	2 N/A	5
CWD (per ha)	366	220	5	220	5	320	5	340	5	40	2
Weed Cover (%)	0	30	3	13	5	20	5	10	5	7	5
Sum of Scores	**-**	**-**	**49.5**	**-**	**59**	**-**	**68**	**-**	**63.5**	**-**	**57**
Average BioCondition	**RE 11.9.2 – 59.4/80 = 74**										

RE 11.9.2	BioCondition Benchmark	Site 1 BioCondition Site 11		Site 2 BioCondition Site 12		Site 3 BioCondition Site 15		Site 4 BioCondition Site 22		Site 5 BioCondition Site 23	
	RE 11.9.2	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Score (out of 80)											
BioCondition Score out of 10	**7**										

Table C-6 Benchmark values, raw values and Biocondition scores for sites within RE 11.9.4

RE 11.9.4	BioCondition Benchmark	Site 1 BioCondition Site 17		Site 2 BioCondition Site 18		Site 3 BioCondition Site 20	
	RE 11.9.4	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Recruitment of woody perennial species (%)	100	70	3	67	3	64	3
Native tree species richness Native shrub species richness Native grass species richness Native forb species richness	19 17 3 13	10 25 6 16	2.5 5 5 5	9 17 3 11	2.5 5 5 2.5	11 20 6 8	2.5 5 5 2.5
Tree emergent median height (m)	18	-	3	-	3	-	3
Tree canopy median height (m)	13	15		14		15	
Tree sub-canopy median height (m)	7	6		6		5	
Tree emergent canopy cover (%)	5	0	2.3	0	1	0	1.7
Tree canopy cover (%)	30	10		0		0	
Tree sub-canopy cover (%)	33	49		71		55	
Shrub canopy cover (%)	24	44	5	49	3	42	5
Native perennial grass cover (%)	3	0	0	1	1	3	5
Organic litter cover (%)	60	30	5	34	5	30	5
Number of large Eucalypts (dbh N/A) per ha Number of large non-eucalypts (dbh of ≥25cm) per ha	N/A 146	N/A 18	5	N/A 6	5	N/A 4	5
CWD (per ha)	1035	2390	2	1610	5	540	5
Weed Cover (%)	0	14	5	20	5	4	10

RE 11.9.4	BioCondition Benchmark	Site 1 BioCondition Site 17		Site 2 BioCondition Site 18		Site 3 BioCondition Site 20	
	RE 11.9.4	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Sum of Scores	**-**	**-**	**47.8**	**-**	**46**	**-**	**52.7**
Average BioCondition Score (out of 80)	**RE 11.9.4 – 48.8/80 = 61**						
BioCondition Score out of 10	**6**						

Table C-7 Benchmark values, raw values and Biocondition scores for sites within RE 11.9.7

RE 11.9.7	BC Benchmark	Site 1 BC Site 1		Site 2 BC Site 14		Site 3 BC Site 16		Site 4 BC Site 21		Site 5 BC Site 26		Site 6 BC Site 3	
	RE 11.9.7	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score
Recruitment of woody perennial species (%)	100	100	5	100	5	50	3	100	5	100	5	33	3
Native tree species richness Native shrub species richness Native grass species richness Native forb species richness	3 5 9 28	1 7 9 27	2.5 5 5 5	5 10 5 19	5 5 2.5 2.5	2 9 14 16	2.5 5 5 2.5	5 12 16 21	5 5 5 2.5	3 10 10 24	5 5 5 2.5	2 2 9 17	2.5 2.5 5 2.5
Tree canopy median height (m)	17	14.5	5	16	5	17	5	16	4	18	5	18	4
Tree sub-canopy median height (m)	9	9		8		7		5		7		6	
Tree canopy cover (%)	27	26	2.5	57	1.5	28	5	40	4	57	4	14	5
Tree sub-canopy cover (%)	12	0		0		7		25.5		24		8	
Shrub canopy cover (%)	1	2	5	9	3	14	3	16	3	13	3	0	0
Native perennial grass cover (%)	26	5	1	7	1	25	5	10	1	30.6	5	9	1
Organic litter cover (%)	15	12	5	8	5	27	5	14.6	5	41	3	52	3
Number of large Eucalypts (dbh of ≥40cm) per ha	14 2	32 0	15	0 0	0	20 0	15	10 4	10	20 0	15	6 0	5

RE 11.9.7	BC Benchmark	Site 1 BC Site 1		Site 2 BC Site 14		Site 3 BC Site 16		Site 4 BC Site 21		Site 5 BC Site 26		Site 6 BC Site 3	
	RE 11.9.7	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score	Raw values	BC Score
Number of large non-eucalypts (dbh of ≥22cm) per ha													
CWD (meters per ha)	287	290	5	230	5	690	2	220	5	610	2	330	5
Weed Cover (%)	0	26	3	30	3	7	5	40	3	10	5	16	5
Sum of Scores	**-**	**-**	**64**	**-**	**43.5**	**-**	**63**	**-**	**57.5**	**-**	**64.5**	**-**	**43.5**
Average BioCondition Score (out of 80)	**RE 11.9.7 – 56/80 = 70**												
BioCondition Score out of 10	**7**												

Table C-8 Benchmark values, raw values and BioCondition scores for sites within RE 11.9.9

RE 11.9.9	BioCondition Benchmark	Site 1 BioCondition Site 4		Site 2 BioCondition Site 9		Site 3 BioCondition Site 24		Site 4 BioCondition Site 27		Site 5 BioCondition Site 28	
	RE 11.9.9	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Recruitment of woody perennial species (%)	100	43	3	80	5	100	5	80	5	100	5
Native tree species richness	3	7	5	5	5	1	2.5	5	5	3	5
Native shrub species richness	7	9	5	7	5	10	5	11	5	6	2.5
Native grass species richness	7	8	5	8	5	9	5	13	5	12	5
Native forb species richness	8	21	5	22	5	22	5	23	5	25	5
Tree canopy median height (m)	18	14	5	18	5	15	5	14	5	14	5
Tree sub-canopy median height (m)	6	8		10		9		9		7	
Tree canopy cover (%)	20	36	4	22	4	60	4	26	4	18	4

RE 11.9.9	BioCondition Benchmark	Site 1 BioCondition Site 4		Site 2 BioCondition Site 9		Site 3 BioCondition Site 24		Site 4 BioCondition Site 27		Site 5 BioCondition Site 28	
	RE 11.9.9	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Tree sub-canopy cover (%)	4	9		17		2		14		14	
Shrub canopy cover (%)	5	1	3	4	5	8	5	5	5	14	3
Native perennial grass cover (%)	22	40	5	50	5	44	5	45.6	5	31	5
Organic litter cover (%)	39	10	3	15	3	17	3	8	3	22	5
Number of large Eucalypts (dbh of ≥51cm) per ha Number of large non-eucalypts (dbh N/A) per ha	12 N/A	8 N/A	10	0 N/A	0	4 N/A	5	4 N/A	5	10 N/A	10
CWD (per ha)	268	160	5	510	5	660	2	550	2	200	5
Weed Cover (%)	0	10	5	6	5	30	3	30	3	10	5
Sum of Scores	**-**	**-**	**63**	**-**	**57**	**-**	**54.5**	**-**	**57**	**-**	**64.5**
Average BioCondition	**RE 11.9.9 – 59.2/80 = 74**										

RE 11.9.9	BioCondition Benchmark	Site 1 BioCondition Site 4		Site 2 BioCondition Site 9		Site 3 BioCondition Site 24		Site 4 BioCondition Site 27		Site 5 BioCondition Site 28	
	RE 11.9.9	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score	Raw values	BioCondition Score
Score (out of 80)											
BioCondition Score out of 10	**7**										

Appendix D Habitat Condition Assessment Locations and Scores

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

SLR Project No.: 626.30128.00000

17 December 2025

Table D-1 Location of each Habitat Condition Assessment Site

Site Name	Regional Ecosystem	Easting	Northing
HC 1	RE 11.9.7	647326	7621969
HC 2	RE 11.3.25a	646946.9	7622085
HC 3	non-remnant	646838.6	7622114
HC 4	RE 11.3.25a	646425.8	7622240
HC 5	RE 11.9.7	646163.8	7622289
HC 6	RE 11.9.7	646108.4	7622301
HC 7	non-remnant	642456.6	7630643
HC 8	RE 11.9.9	643690.9	7631082
HC 9	RE 11.3.25a	643837.6	7630748
HC 10	RE 11.3.25a	643972.6	7630670
HC 11	RE 11.3.4	643012.9	7631372
HC 12	RE 11.9.9	643159.5	7630600
HC 13	non-remnant	642871.3	7630526
HC 14	RE 11.3.25a	643119.5	7630464
HC 15	non-remnant	643311.1	7630336
HC 16	RE 11.3.4	643601.9	7630468
HC 17	RE 11.3.25a	643678.2	7630505
HC 18	RE 11.3.4	643584	7630028
HC 19	RE 11.9.9	643883.9	7630293
HC 20	RE 11.9.9	644264.7	7630512
HC 21	RE 11.9.9	644844	7629908
HC 22	RE 11.9.7	643956	7629646
HC 23	RE 11.4.2	644797.7	7630356
HC 24	RE 11.9.9	645091.6	7630053
HC 25	RE 11.9.9	645312.9	7630226
HC 26	RE 11.4.2	644047.1	7629833
HC 27	RE 11.9.2	651500.8	7619896
HC 28	RE 11.9.7	650188.1	7620081
HC 29	non-remnant	650027.4	7620482
HC 30	RE 11.9.7	649628.2	7620334
HC 31	RE 11.9.2	649947	7621024
HC 32	RE 11.3.4	649970.8	7620969
HC 33	RE 11.3.4	650232.2	7620764
HC 34	RE 11.9.2	650524.1	7620382
HC 35	RE 11.9.7	650732.5	7619465

Site Name	Regional Ecosystem	Easting	Northing
HC 36	RE 11.9.4	651195.4	7620484
HC 37	RE 11.9.4	651950.4	7619982
HC 39	RE 11.9.4	651760.3	7620129
HC 40	RE 11.9.7	651214.8	7619006
HC 41	RE 11.9.2	650098.5	7619482
HC 42	RE 11.9.2	651860.2	7619207
HC 43	RE 11.9.9	650572.9	7621030
HC 44	RE 11.3.4	650294.4	7620911
HC 45	RE 11.9.7	650397.5	7620823
HC 46	RE 11.9.9	643414.3	7631489
HC 47	RE 11.9.9	643411.6	7630897
HC 48	RE 11.3.25/11.3.4	642321.7	7630880
HC 49	RE 11.3.4	642661.3	7630088

Table D-2 Habitat condition (HC) scores for Koala in various vegetation communities

Koala	Indicator	RE 11.3.4 Sites					RE 11.3.25 Sites						RE 11.4.2 Sites		RE 11.9.2 Sites					RE 11.9.7 Sites								RE 11.9.9 Sites						
		11	16	33	44	49	2	4	9	10	14	48	23	26	27	31	34	41	42	1	6	22	28	35	40	45	5	8	12	19	24	43	46	47
Quality and availability of food and habitat required for foraging	Relative percent abundance of *Eucalyptus* food trees	0	20	20	20	15	15	15	5	10	0	15	20	25	25	25	25	20	20	20	10	20	25	25	20	20	15	20	15	15	25	20	15	20
	Relative number of feed trees present	5	15	25	10	10	10	20	10	10	5	10	25	25	20	25	25	5	5	5	10	15	25	25	5	5	15	15	5	15	25	5	10	5
	Leaf moisture, trees situated near semi or permanent water sources	25	20	25	20	15	25	25	25	25	25	25	5	5	5	5	5	10	5	5	20	25	5	5	10	10	10	10	10	5	15	15	10	5
Average		**10.0**	**18.3**	**23.3**	**16.7**	**13.3**	**16.7**	**20.0**	**13.3**	**15.0**	**10.0**	**16.7**	**16.7**	**18.3**	**16.7**	**18.3**	**18.3**	**11.7**	**10.0**	**10.0**	**13.3**	**20.0**	**18.3**	**18.3**	**11.7**	**11.7**	**13.3**	**15.0**	**10.0**	**11.7**	**21.7**	**13.3**	**11.7**	**10.0**
Quality and availability of habitat required for breeding and shelter	Open forest woodland, open woodland incl. remnant and regrowth with structural complexity to shelter from heat and predation	20	20	20	20	20	25	20	20	20	20	25	20	20	15	15	15	15	10	15	5	15	20	20	15	15	10	15	20	20	15	15	20	15
	Preferred 11.3.2, 11.3.2a, 11.3.2b, 11.3.4, 11.3.4a, 11.3.25, 11.3.27. Various others suitable or marginal	25	25	25	20	15	25	25	25	25	25	20	15	15	5	5	5	5	10	10	10	25	10	5	10	15	20	10	10	15	15	10	15	10
	High canopy cover	15	15	20	15	15	20	20	15	10	15	25	15	10	15	20	15	10	10	10	15	15	20	20	5	10	10	15	5	10	15	10	10	10
Average		**20.0**	**20.0**	**21.7**	**18.3**	**16.7**	**23.3**	**21.7**	**20.0**	**18.3**	**20.0**	**23.3**	**16.7**	**15.0**	**11.7**	**13.3**	**11.7**	**10.0**	**10.0**	**11.7**	**10.0**	**18.3**	**16.7**	**15.0**	**10.0**	**13.3**	**13.3**	**13.3**	**11.7**	**15.0**	**15.0**	**11.7**	**15.0**	**11.7**
Quality and availability of habitat required for mobility	Canopy connectivity	20	15	15	15	10	20	15	20	20	15	25	15	15	15	15	15	5	5	5	5	10	15	15	5	10	5	15	5	10	15	5	10	10
	Trees likely selected based on height, canopy cover	20	15	15	20	15	20	20	20	15	15	20	15	15	15	15	15	10	10	15	15	15	20	15	15	10	20	20	15	10	15	10	10	10

Koala	Indicator	RE 11.3.4 Sites					RE 11.3.25 Sites						RE 11.4.2 Sites		RE 11.9.2 Sites					RE 11.9.7 Sites								RE 11.9.9 Sites						
		11	16	33	44	49	2	4	9	10	14	48	23	26	27	31	34	41	42	1	6	22	28	35	40	45	5	8	12	19	24	43	46	47
	Preferred 11.3.2, 11.3.2a, 11.3.2b, 11.3.4, 11.3.4a, 11.3.25, 11.3.27. Various others suitable or marginal	25	25	25	20	15	25	25	25	25	25	20	15	15	5	5	5	5	10	10	10	25	5	5	10	15	20	10	10	15	15	10	15	10
	Percentage of remnant vegetation within 500m	25	25	15	20	20	25	15	25	25	20	15	25	20	25	20	25	20	15	25	10	25	25	25	20	20	10	25	15	25	20	15	20	15
Average		**22.5**	**20.0**	**17.5**	**18.8**	**15.0**	**22.5**	**18.8**	**22.5**	**21.3**	**18.8**	**20.0**	**17.5**	**16.3**	**15.0**	**13.8**	**15.0**	**10.0**	**10.0**	**13.8**	**10.0**	**18.8**	**16.3**	**15.0**	**12.5**	**13.8**	**13.8**	**17.5**	**11.3**	**15.0**	**16.3**	**10.0**	**13.8**	**11.3**
Absence of threats	Vehicle strikes	12	12	16	16	16	12	12	15	15	16	16	15	15	15	15	16	16	16	12	12	6	12	16	16	16	12	15	16	16	16	16	16	16
	Heat wave or drought	6	6	4	4	6	2	2	8	8	4	6	6	6	4	4	4	4	4	2	2	6	6	4	4	6	2	4	4	4	4	4	4	4
	Predation from invasive species	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
	Fragmentation of habitat	4	4	2	2	2	3	3	2	2	2	2	4	4	2	2	2	2	2	3	3	6	2	2	2	2	3	12	2	2	2	2	2	2
Score		**4**	**4**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**4**	**4**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**6**	**2**	**2**	**2**	**2**	**2**	**4**	**2**	**2**	**2**	**2**	**2**	**2**
Overall Site Score (%)		**56.5**	**62.3**	**64.5**	**55.8**	**47**	**64.5**	**62.5**	**57.8**	**56.6**	**50.8**	**62**	**54.9**	**53.6**	**45.4**	**47.4**	**47**	**33.7**	**32**	**37.5**	**35.3**	**63.1**	**53.3**	**50.3**	**36.2**	**40.8**	**42.4**	**49.8**	**35**	**43.7**	**55**	**37**	**42.5**	**35**
Average Score (%)		**RE 11.3.4 57.2**					**RE 11.3.25 59**						**RE 11.4.2 54.3**		**RE 11.9.2 41.1**					**RE 11.9.7 43.8**								**RE 11.9.9 42.5**						
Species Habitat Score		**6**					**6**						**5**		**4**					**4**								**4**						

Table D-3 Habitat condition (HC) scores for Squatter Pigeon in various vegetation communities

Squatter Pigeon	Indicator	RE 11.3.4 Sites					RE 11.3.25 Sites						RE 11.4.2 Sites		RE 11.9.2 Sites					RE 11.9.7 Sites								RE 11.9.9 Sites						
		11	16	33	44	49	2	4	9	10	14	48	23	26	27	31	34	41	42	1	6	22	28	35	40	45	5	8	12	19	24	43	46	47
Quality and availability of food and habitat required for foraging	Mostly seeds of Fabaceae, incl. exotic pasture plants e.g., Stylosanthes and native grasses	10	15	15	5	5	15	10	2	2	10	5	20	20	15	15	15	10	10	15	5	15	20	15	15	10	15	15	20	15	15	10	10	10
	Drinks water daily. Nearly always within 3km of waterbodies. Gently sloping bare ground on bank	25	20	25	25	25	25	25	25	25	25	25	15	15	10	15	20	15	10	15	20	20	10	15	15	25	20	15	25	20	20	25	25	10
	Overstory generally dominated by Eucalyptus, Corymbia, Acacia or Callitris	5	25	25	20	15	20	20	10	10	0	15	25	25	25	25	25	20	20	25	20	25	25	25	20	20	20	25	15	25	25	20	20	20
Average		**13.3**	**20.0**	**21.7**	**16.7**	**15.0**	**20.0**	**18.3**	**12.3**	**12.3**	**11.7**	**15.0**	**20.0**	**20.0**	**16.7**	**18.3**	**20.0**	**15.0**	**13.3**	**18.3**	**15.0**	**20.0**	**18.3**	**18.3**	**16.7**	**18.3**	**18.3**	**18.3**	**20.0**	**20.0**	**20.0**	**18.3**	**18.3**	**13.3**
Quality and availability of habitat required for breeding and shelter	Needs well-draining soils, nests on ground in various landzones probably within 1km of water	15	15	15	15	10	2	10	15	20	10	5	15	15	5	25	20	10	10	15	5	10	15	15	5	15	5	20	15	20	15	15	20	20
	Overstorey generally dominated by Eucalyptus, Corymbia, Acacia or Callitris	5	25	25	20	15	20	20	10	10	0	15	25	25	25	25	25	20	20	25	20	25	25	25	20	20	20	25	15	25	25	20	20	20
	Remnant, regrowth, partly modified communities;	20	20	25	20	20	15	25	20	20	20	20	20	20	20	20	20	20	20	20	10	20	20	20	20	20	10	20	20	25	20	20	20	20

Squatter Pigeon	Indicator	RE 11.3.4 Sites					RE 11.3.25 Sites						RE 11.4.2 Sites		RE 11.9.2 Sites					RE 11.9.7 Sites								RE 11.9.9 Sites						
		11	16	33	44	49	2	4	9	10	14	48	23	26	27	31	34	41	42	1	6	22	28	35	40	45	5	8	12	19	24	43	46	47
	tracks and roadsides																																	
Average		**13.3**	**20.0**	**21.7**	**18.3**	**15.0**	**12.3**	**18.3**	**15.0**	**16.7**	**10.0**	**13.3**	**20.0**	**20.0**	**16.7**	**23.3**	**21.7**	**16.7**	**16.7**	**20.0**	**11.7**	**18.3**	**20.0**	**20.0**	**15.0**	**18.3**	**11.7**	**21.7**	**16.7**	**23.3**	**20.0**	**18.3**	**20.0**	**20.0**
Quality and availability of habitat required for mobility	Overstorey generally dominated by Eucalyptus, Corymbia, Acacia or Callitris	5	25	25	20	15	15	20	10	10	0	15	25	25	25	25	25	20	20	25	20	25	25	25	20	20	20	25	15	25	25	20	20	20
	Open forests to sparse open woodlands and scrub. Generally open, short grass cover (rarely exceeds 33%)	15	5	20	5	5	5	5	15	10	10	5	15	20	20	20	15	10	5	15	5	10	20	20	10	10	15	15	15	20	15	10	5	15
	Bare ground under tree canopy; bare gravelly or dusty patches with leaf litter and CWD; roads, stockyards	15	5	15	5	5	5	10	20	20	10	5	15	10	20	20	20	5	5	10	5	10	15	15	10	10	10	20	20	20	10	10	5	15
	Remnant, regrowth, partly modified communities; tracks and roadsides	20	20	25	20	20	15	20	20	20	20	20	20	20	20	20	20	20	20	20	10	20	20	20	20	20	10	20	20	25	20	20	20	20
Average		**13.8**	**13.8**	**21.3**	**12.5**	**11.3**	**10.0**	**13.8**	**16.3**	**15.0**	**10.0**	**11.3**	**18.8**	**18.8**	**21.3**	**21.3**	**20.0**	**13.8**	**12.5**	**17.5**	**10.0**	**16.3**	**20.0**	**20.0**	**15.0**	**15.0**	**13.8**	**20.0**	**17.5**	**22.5**	**17.5**	**15.0**	**12.5**	**17.5**
Absence of threats	Vehicle strike	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
	Predation from invasive species	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Decrease in available food due to undesirable	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Squatter Pigeon	Indicator	RE 11.3.4 Sites					RE 11.3.25 Sites						RE 11.4.2 Sites		RE 11.9.2 Sites					RE 11.9.7 Sites								RE 11.9.9 Sites						
		11	16	33	44	49	2	4	9	10	14	48	23	26	27	31	34	41	42	1	6	22	28	35	40	45	5	8	12	19	24	43	46	47
	pasture species																																	
	Decreased availability of permanent/ semi-permanent surface water	6	6	6	6	4	6	6	4	4	6	4	4	6	6	6	6	6	6	6	6	4	4	4	6	4	9	4	4	4	6	4	4	4
Score		**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Overall Site Score (%)		**44.4**	**57.8**	**68.7**	**51.5**	**45.3**	**46.3**	**54.4**	**47.6**	**48**	**35.7**	**43.6**	**62.8**	**62.8**	**58.7**	**66.9**	**65.7**	**49.5**	**46.5**	**59.8**	**40.7**	**58.6**	**62.3**	**62.3**	**50.7**	**55.6**	**47.8**	**64**	**58.2**	**69.8**	**61.5**	**55.6**	**54.8**	**54.8**
Average Score (%)		**RE 11.3.4 53.5**					**RE 11.3.25 45.9**						**RE 11.4.2 62.8**		**RE 11.9.2 60.2**					**RE 11.9.7 51.1**								**RE 11.9.9 59.3**						
Species Habitat Score		**5**					**5**						**6**		**6**					**5**								**6**						

Appendix E Representative Photographs

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

SLR Project No.: 626.30128.00000

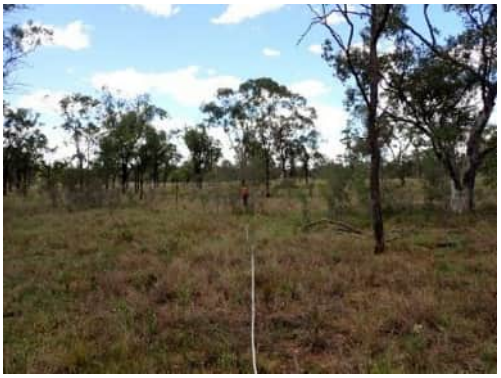
17 December 2025

Table E-1 Representative photographs

Site Photographs	Photograph 1	Photograph 2
BioCondition site 1		
BioCondition site 2		
BioCondition site 3		
BioCondition site 4		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 5		
BioCondition site 6		
BioCondition site 7		
BioCondition site 8		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 9		
BioCondition site 10		
BioCondition site 11		
BioCondition site 12		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 13		
BioCondition site 14		
BioCondition site 15		
BioCondition site 16		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 17		
BioCondition site 18		
BioCondition site 20		
BioCondition site 21		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 22		
BioCondition site 23		
BioCondition site 24		
BioCondition site 25		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 26		
BioCondition site 27		
BioCondition site 28		
BioCondition site 29		

Site Photographs	Photograph 1	Photograph 2
BioCondition site 30		

Appendix F High Risk of Impact Species Management Program (EcoSM, 2021)

Hail Creek Open Cut Eastern Margin Extension

Ecological Impact Assessment Report

Hail Creek Coal Holdings Pty Limited

SLR Project No.: 626.30128.00000

17 December 2025

HAIL CREEK MINE

HIGH RISK OF IMPACT SPECIES MANAGEMENT PROGRAM

Glencore (Hail Creek Mine)

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March 2021

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Appendix A: Previous ecological studies undertaken at HCM
Appendix B: Fauna and breeding place management protocols

Symbols and abbreviations

*	Denotes a species not native to Australia
DAWE	(Commonwealth) Department of Agriculture, Water and the Environment
DES	(Queensland) Department of Environment and Science
EA	Environmental Authority
EIS	Environmental Impact Statement
EVNT	Refers to endangered, vulnerable, near threatened species protected under the Queensland *Nature Conservation Act 1992*.
HCM	Hail Creek Mine
ML	Mining Lease
NC Act	(Queensland) *Nature Conservation Act 1992*
SLC	Refers to special least concern species protected under the Queensland *Nature Conservation Act 1992*.
SMP	Species Management Program

Glossary

Animal breeding place	A bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring.
Colonial breeders	A group of animals of the same kind co-existing in close association for breeding purposes.
Endangered	Listed as 'endangered' under the Nature Conservation (Animals) Regulation 2020
Environmental Superintendent	HCM person responsible for implementing, monitoring, review and reporting in accordance with this SMP.
Gilgai	Small ephemeral depressions that naturally form in the soil surface. Usually forming in cracking clay soils.
Licensed wildlife carer	A person authorised under a current rehabilitation permit to take and/or keep a protected animal whose habitat is about to be destroyed by human activity in accordance with the Nature Conservation (Animals) Regulation 2020
Near Threatened	Listed as 'near threatened' under the Nature Conservation (Animals) Regulation 2020
Protected wildlife	Native wildlife prescribed under the *Nature Conservation Act 1992* as: ▪ extinct in the wild wildlife ▪ endangered wildlife ▪ vulnerable wildlife ▪ near threatened wildlife ▪ least concern wildlife.
Special least concern animal	Under this SMP refers to the following: ▪ Echidna (*Tachyglossus aculeatus*).
Spotter/catcher	A person authorised under a current rehabilitation permit to take and/or keep a protected animal whose habitat is about to be destroyed by human activity in accordance with the Nature Conservation (Animals) Regulation 2020.
Suitably qualified and experienced	A person with formal qualification and/or experience in identification of native animals and wildlife ecology. A person is considered to be suitably qualified and experienced if they meet one or more of the following criteria: ▪ an ecological consultant with experience in conducting surveys for native animal breeding places ▪ a person who possesses a degree in natural science or similar with experience in conducting surveys for native animal breeding places ▪ a person who is authorised as a spotter/catcher under a rehabilitation permit granted under the Nature Conservation Act 1992.
Tamper	To damage, destroy, mark, move or dig up.
Vulnerable	Listed as 'Vulnerable' under the Nature Conservation (Animals) Regulation 2020

1 Introduction

Hail Creek Mine (HCM) is an open cut coal mine located 120 km south-west of Mackay in central Queensland on Lot 17 on SP236270 (Figure 1). HCM began operations in 2003 and underwent an expansion in 2006. HCM is managed by Glencore on behalf of joint venture partners Nippon Steel & Sumitomo Metal Corporation (NSSMC), Marubeni Coal Pty Ltd and Sumitomo Coal Development Pty Ltd.

HCM covers an area of 11,530 ha and using a dragline, truck and shovel method, coal is mined from two seams, namely the Elphinstone and Hynds Seams. As part of normal operations of HCM vegetation clearing may be required within the HCM mining lease (ML) as mining operations progress towards the east (Figure 1). The Plan of Operations indicates the area to be disturbed for future mining operations and is regularly updated.

Two land-based environmental offset areas have been established in the HCM ML (Figure 1). These offset areas provide compensation for impacts to matters of environmental significance protected under Commonwealth and State legislation associated with mining operations. The 2015 Offset Area encompasses approximately 279 ha and the Black Ironbox Offset Area encompasses approximately 610 ha (Figure 1).

This 'High risk of impact' Species Management Program (SMP) has been prepared to manage all activities that will tamper with animal breeding places at HCM, in accordance with the legislative requirements of the *Nature Conservation Act 1992* (NC Act).

1.1 Legislative Framework

Approval for HCM was granted with mining lease (ML) 700026 and ML4738, with operations commencing in 2003. Operations were expanded in 2006 and 2016. HCM operates under Environmental Authority EPML00661913, which applies to the surface rights ML shown in Figure 1.

Under Section 335 of the Nature Conservation (Animals) Regulation 2020 (the Regulation), 'a person must not, without a reasonable excuse, tamper with an animal breeding place that is being used by a protected animal to incubate or rear the animal's offspring', unless 'an approved species management program for animals of the same species' is in place.

The Regulation states that an animal breeding place is being used by a protected animal "to incubate or rear the animal's offspring" in the following circumstances:

- the animal is preparing, or has prepared, the place for incubating or rearing the animal's offspring; or
- the animal is breeding, or is about to breed, and is physically occupying the place; or

- the animal and the animal's offspring are physically occupying the place, even if the occupation is only periodical; or
- the animal has used the place to incubate or rear the animal's offspring and is of a species generally known to return to the same place to incubate or rear offspring in each breeding season for the animal.

Under Section 335 (3) of the Regulation a "High risk of impact" SMP is required if the proposed activities are likely to tamper with animal breeding places for:

a) protected animals prescribed as extinct in the wild, endangered, vulnerable, near threatened, or a special least concern animal under the Wildlife Regulation; or

b) least concern animals that are colonial breeders; or

c) least concern animals where proposed tampering with a breeding place may have impacts on the broader population of that species of animal.

A number of protected animals have been recorded at HCM and therefore, this SMP addresses protected animals, which are likely to occur and for which a breeding place is reasonably likely to be encountered during any vegetation clearing within the HCM ML.

High Risk SMPs have previously been in place at HCM, the most recent of which being HCM document '*Species Management Program HCM-10-E14-PRG-001'*, approved by the then Queensland Department of Environment and Heritage Protection on 4 May 2016.

This SMP will also cover tampering with the breeding places of a broad range of 'Least Concern' fauna species that have been recorded within the HCM ML.

1.2 Scope of SMP

This SMP applies to all activities associated with HCM that have the potential to tamper with animal breeding places, in accordance with the legislative requirements of the NC Act.

The animal species for which breeding places may occur at HCM and therefore may require tampering with, are as follows:

- species listed as vulnerable under the NC Act that have been recorded at HCM:
  - Australian Painted Snipe (*Rostratula australis*)
  - Glossy Black-cockatoo (eastern) (*Calyptorhynchus lathami lathami*)
  - Squatter Pigeon (*Geophaps scripta scripta*)
  - Greater Glider (*Petauroides volans*)
  - Ornamental Snake (*Denisonia maculata*).

DES (2016) stipulate that Koalas are not included in SMP documentation, as Koalas do not use a habitual breeding place. However, it can be difficult to determine if a Koala is carrying young, particularly when an individual is high in the tree canopy. Therefore, a precautionary approach has been adopted in this SMP and specific measures have been included in Section 4 to minimise the risk of injury or harm to Koalas.

- 'Special Least Concern' (SLC) animals, in particular the Short-beaked Echidna (*Tachyglossus aculeatus*). Other SLC animals are considered less likely to occupy and/or breed within the HCM due to the dispersive nature of many SLC birds or lack of suitable breeding habitat.
- 'colonial breeding species' that have been recorded at HCM, including but not limited to:
  - Squirrel Glider (*Petaurus norfolcensis*)
  - Sugar Glider (*Petaurus breviceps*)
  - Gould's Long-eared Bat (*Nyctophilus gouldi*)
  - Inland Broad-nosed Bat (*Scotorepens balstoni*)
  - Little Bent-winged Bat (*Miniopterus australis*)
  - Gould's Wattled Bat (*Chalinolobus gouldii*)
  - Hoary Wattled Bat (*Chalinolobus nigrogriseus*).

Extensive survey and monitoring has been undertaken at HCM as outlined in Section 2. It is considered unlikely that any additional endangered, vulnerable or near threatened (EVNT) species, other than those listed above, would occur at HCM.

This SMP is effective for a period of three years from the date of approval.

1.3 Applicant

Applicant: Hail Creek Coal Pty Ltd

Registered Legal Entity: Hail Creek Coal Pty Ltd

Registered Business Address: PO Box 107, Glenden Qld 4743

Contact: Christopher Wilson – Senior Environment and Community Advisor

Telephone No.: +61 456 749 478

Email: christopher.wilson@glencore.com.au

Website: http://www.glencore.com.au

ABN: 59 080 002 008

2 Background Information

The biodiversity values of HCM have been investigated through multiple studies between 1995 and 2019 and a significant volume of data has been collected over this time for the site. Key drivers for these studies has generally been associated with development of the mine, much of which formed part of conditions and strategies relating to nature conservation in the Plan of Operations for the mine. The most recent assessment of impacts to threatened fauna at HCM was undertaken as part the terrestrial ecology assessment for the Hail Creek Transition Project in 2015 (refer Appendix A). This impact assessment covered a large portion of the eastern margin of the HCM ML.

Appendix A includes a list of the documents that have been prepared in relation to these various studies.

These studies range from largely anecdotal assessment, prior to development of standard survey guidelines to detailed seasonal flora and fauna surveys using a suite of survey and trapping techniques, in accordance with Queensland and Commonwealth guidelines. The most current field surveys were undertaken in 2019 as part of on-going monitoring of the Black Ironbox and 2015 Offset Areas that have been established under state approved Offset Management Plans and Commonwealth approved Biodiversity Offset Strategies. The ecological surveys undertaken in the last five years and listed in Appendix A have been conducted by qualified ecologists, each with in excess of 15 years relevant experience.

The following species listed under the NC Act have been recorded at HCM as part of surveys completed across the MLA

- Australian Painted Snipe (endangered)
- Glossy Black-cockatoo (vulnerable)
- Squatter Pigeon (vulnerable)
- Greater Glider (vulnerable)
- Koala (vulnerable)
- Ornamental Snake (vulnerable).

Numerous other migratory, special least concern and colonial breeding species have also been identified as listed in Section 1.2. Figure 2 shows the broad habitat types that have been mapped at HCM and which form potential breeding habitat of the species listed above.

Eucalypt woodland habitat occurs throughout the HCM, with aquatic and wetland habitat immediately adjacent to the west of the current pit, as well as in the far south of the ML associated with the confluence of the Hail Creek, Bee Creek and Middle Creek. Riparian habitat occurs along each of these creeks, particularly Hail Creek and Middle Creek. Brigalow and Natural Grassland habitat occurs in small patches primarily in the south of HCM.

3 Relevant Species

As outlined in Section 1.2 a number of colonial breeding species have been recorded at HCM and potential breeding habitat for special least concern species, such as the Short-beaked Echidna (*Tachyglossus aculeatus*) is likely to be present. These species are generally considered to be commonly occurring and potential habitat is widespread at HCM. As such, breeding place habitat cannot be specified for this SMP. However, all of these species are easily recognisable and control measures proposed in Section 4 are relevant to these species.

Profiles of each of the EVNT species that have been recorded at HCM are provided in the following sections. Figure 1 shows where each of these species has been recorded at HCM.

3.1 Australian Painted Snipe

One record of the Australian Painted Snipe exists for the HCM, along a broad, shallow drainage line to the south-east of the pit and to the east of Hail Creek (Figure 1). This record is from surveys undertaken in early 2013. This species could potentially breed in Freshwater Wetlands with a good cover of low fringing vegetation on HCM (Figure 2).

Preferred habitat

This species is secretive, cryptic and crepuscular (most active at dawn and dusk). It occurs in terrestrial shallow wetlands, both ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains. The species feeds on vegetation, seeds, and invertebrates including crustaceans and molluscs (Marchant and Higgins 1993).

Biology and reproduction

This is a stocky wading bird to 250 mm in length, with a long pinkish bill. The female bird has a chestnut-coloured head, with white around the eye and a white crown stripe, and metallic green back and wings. Whereas the male is less colourful, lacking the chestnut-coloured head. Both have a pale stripe extending from the shoulder into a V down the upper back (Plate 1) (DAWE 2020a).

Nests are usually within a scrape in the ground in wetland habitats. This species is known to breed in all months in Australia. Eggs have been recorded from mid-August to March, with breeding in northern Queensland also recorded between May and October (DAWE 2020a). Two to six eggs are laid, with clutches being laid up to four times a year. Incubation takes 15-21 days and young are able to leave the nest and become independent a few days after hatching (DAWE 2020a).



Plate 1: Australian Painted Snipe

Potential threats at HCM

Potential threats to this species at HCM include:

- clearing vegetation fringing or in close proximity to wetlands
- disturbance to water quality or surface hydrology surrounding wetland habitat
- bank erosion of aquatic habitat
- introduction of aquatic weeds and ponded pastures
- activities near wetlands causing substantial noise, dust or light-shed.

3.2 Glossy Black-cockatoo

The Glossy Black-cockatoo was identified at one location in the 2012 monitoring surveys (Figure 1). As HCM contains few stands of *Allocasuarina* or *Casuarina* to provide suitable feeding habitat for this species it is considered likely to occur at HCM on rare occasions and is unlikely to breed on the site. This is supported by the fact that it had not been detected in the large number of previous surveys conducted across HCM until 2012.

Preferred habitat

This species mainly occurs in eucalypt woodlands and forests in which there is a sub-canopy or understorey of *Allocasuarina*/*Casuarina*, but Brigalow is also used in south-eastern Queensland. The diet of this species is almost exclusively the seeds of *Allocasuarina/Casuarina* (Garnett and Crowley 2000).

Biology and reproduction

Egg laying by Gloss Black-cockatoo occurs from March to June and fledging may occur as late as October (Glossy Black Conservancy 2010 Higgins 1999) (Plate 2). This species nests in hollows usually in eucalypts, in live or dead trees, laying a single egg (Glossy Black Conservancy 2010 Higgins 1999).



(Source: Ben Nottidge)

Plate 2: Glossy Black-cockatoo

Potential threats at HCM

Potential threats to this species at HCM include:

- disturbance or removal of feed trees
- loss of tree hollows in which to nest.

3.3 Squatter Pigeon

The Squatter Pigeon was recorded at a number of locations at HCM in 2010. The species has also been recorded opportunistically during monitoring surveys in 2011 and 2012 (Ecological Survey & Management 2013) and during fauna surveys for the Hail Creek Transition Project in 2013/2014 (Ecological Survey & Management 2015). The Squatter Pigeon was generally observed in disturbed areas such as tracks, cattle camps and watering points (Figure 1).

Preferred habitat

The Squatter Pigeon (southern) occurs on the inland slopes of the Great Dividing Range. Its distribution extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coastline between Proserpine and Port Curtis (near Gladstone), and south to scattered sites throughout south-eastern Queensland. It occurs mainly in grassy woodlands and open forests that are dominated by eucalypts. It has also been recorded in sown grasslands with scattered remnant trees, disturbed habitats (i.e. around stockyards, along roads and railways, and around settlements), in scrub and acacia growth, and remains common in heavily grazed country north of the Tropic of Capricorn. The species is commonly observed in habitats that are located close to bodies of water (DAWE 2020b).

Within HCM the Squatter Pigeon is considered most likely to breed within the areas of eucalypt woodland (DAWE 2020b) (Figure 2). It is often observed along-side tracks and close to cattle water troughs within the lease area.

Biology and reproduction

The Squatter Pigeon (southern) is a medium-sized, ground-dwelling pigeon that measures approximately 30 cm in length and weighs about 190 to 250 g. The adults are predominantly grey-brown, but have black and white stripes on the face and throat, blue-grey skin around the eyes, dark brown (and some patches of iridescent green or violet) on the upper surfaces of the wings, blue-grey on the lower breast and belly, white on the lower region and flanks of the belly and extending onto the under surfaces of the wings, and a blackish-brown band along the trailing edge of the tail (Plate 3). They have black bills, dark brown irises, and dull purple legs and feet. The sexes are similar in appearance (DAWE 2020b).

This species nests on the ground potentially throughout the year, usually laying two eggs, in a depression, in a sheltered position. Breeding is most likely during the dry season, between April and October (DAWE 2020b).



Plate 3: Squatter Pigeon

Potential threats at HCM

Potential threats to this species at HCM include:

- habitat loss, fragmentation or degradation due to overgrazing, invasion of exotic species, particularly Buffel Grass (**Cenchrus ciliaris*),
- predation of birds and nests by introduced predators such as Foxes (**Vulpes vulpes*), Cats (*Felis catus*) and Feral Pigs (**Sus scrofa*).

3.4 Greater Glider

The Greater Glider has been recorded within HCM during surveys in 2013, 2015 and 2017 (Ecological Survey & Management 2017; 2015; 2014). The species is typically associated within riparian vegetation associated with drainage lines in the HCM MLA (Figure 1).

Preferred habitat

The Greater Glider occurs in a range of eucalypt-dominated habitats, including low open forests on the coast to tall forests in the ranges and low woodland westwards of the Dividing Range. It does not use rainforest habitats (van Dyck et al. 2013 van Dyck and Strahan 2008). This species favours taller, montane, moist eucalypt forests with relatively old trees and abundant hollows and a diversity of eucalypt species (TSSC 2016). The species has an almost exclusive diet of eucalypt leaves and occasionally flowers or buds (TSSC 2016 van Dyck and Strahan 2008). Although it is known to feed on a range of eucalypt

species, it is likely to only forage on one or two species in any one area (van Dyck and Strahan 2008).

Within HCM the Greater Glider is most likely to inhabit and breed within riparian vegetation, which generally supports a moister vegetation with a higher density of hollow-bearing trees.

Biology and reproduction

The Greater Glider is the largest gliding possum in Australia, with a head and body length of 35 to 46 cm and a long furry tail measuring 45 to 60 cm. The greater glider has thick fur that increases its apparent size, as well as large furry ears and a short snout (TSSC 2016). The Greater Glider is a nocturnal species and uses tree hollows during the day to rest (van Dyck and Strahan 2008). It may glide over distances of up to 100 m, however, it appears to have low dispersal ability and typically small home ranges of 1-4 ha.

Females give birth to a single young from March to June. Females give birth to a single young, which remains in the pouch until four months of age and is then either left in the nest or rides the mother's back (Menkhorst and Knight 2011). Sexual maturity is reached in the second year. Longevity has been estimated at 15 years, so generation length is likely to be 7−8 years (TSSC 2016).



Plate 4: Greater Glider

Potential threats at HCM

Potential threats to this species at HCM include:

- habitat loss through clearing of preferred feed trees and hollow-bearing trees
- habitat fragmentation through infrastructure placement and mine expansion.

3.5 Koala

The Koala has been recorded at a number of locations in the HCM ML. One record was from in the original operational mining area (Figure 1). The most recent Koala records are from within the 2015 Offset Area, where scats were recorded within Queensland Blue Gum (*Eucalyptus tereticornis*) woodland on alluvial plains associated with Hail Creek (Ecological Survey & Management 2019).

Preferred habitat

Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus* (DAWE 2020c). The distribution of Koalas is also affected by altitude (limited to <800 m ASL), temperature and, at the western and northern ends of the range, leaf moisture (DAWE 2020c).

Preferred habitat for this species at HCM consists of eucalypt open woodland and forest and riparian woodland.

Biology and reproduction

The Koala is a (mainly) arboreal, medium-sized marsupial with a stocky body, large rounded ears, sharp claws and predominantly grey-coloured fur (Plate 5) (DAWE 2020c). Female Koalas can potentially produce one offspring each year. With births occurring between October and May (DAWE 2020c). The newly-born Koala lives in its mother's pouch for 6–8 months and, after leaving the pouch, remains dependent on the mother, riding on her back. Young Koalas are independent from about 12 months of age (DAWE 2020c).



Plate 5: Koala

Potential threats at HCM

Potential threats to this species at HCM include:

- habitat loss through clearing of preferred trees
- habitat fragmentation through infrastructure placement and mine expansion
- stress and disease through mining and associated activities near Koala habitat causing substantial noise, dust and light
- predation by Wild Dog (**Canis familiaris*)
- vehicle strike.

3.6 Ornamental Snake

The Ornamental Snake has been recorded at HCM in Brigalow habitat to the east of Hail Creek in 2007, 2010, 2011, 2012 monitoring surveys (Ecological Survey & Management 2013) and 2015 Offset Area Targeted Fauna Survey (Ecological Survey & Management 2016) (Figure 1). Within HCM this species is likely to be largely restricted and breed within the areas of Brigalow Open Forest with gilgai to the east of Hail Creek.

Preferred habitat

The Ornamental Snake occurs within, or close to, habitat that is favoured by its prey – frogs. The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai mounds and depressions in Land Zone 4. It also occurs on lake margins and wetlands. Associated vegetation is usually Brigalow (*Acacia harpophylla*), Gidgee (*Acacia cambagei*), Blackwood (*Acacia argyrodendron*) or Coolibah (*Eucalyptus coolabah*) – dominated communities, or pure grassland associated with gilgais. This species shelters under logs, other course woody debris and ground litter (DAWE 2020d).

Biology and reproduction

This is a small, robust, brown, grey-brown or black snake growing up to 50 cm in length with lighter coloured body scales, often with darker streaks or flecks. It has a grey to dark grey head with a pale, narrow collar (DAWE 2020d) (Plate 6).

The Ornamental Snake bears live young in the pre-wet season (September to November) (DAWE 2020d).



Plate 6: Ornamental Snake

Potential threats at HCM

Potential threats to this species at HCM include disturbance of Brigalow habitat to the south-east of HCM, particularly through clearing and cattle grazing.

4 Management Measures

The following controls have been developed to manage all phases of the works. These measures are to be used in conjunction with Appendix B, 'Fauna and breeding place management protocols'. Measures described are considered to exemplify industry standard approaches to fauna management and have been developed for this SMP considering breeding habitats, fauna assemblages and the types of impacts assessed over a number of years for HCM.

Table 1: Control measures

	Controls/measures	Australian Painted Snipe	Glossy Black-cockatoo	Squatter Pigeon	Greater Glider	Koala	Ornamental Snake	Gliders	Micro-bats	SLC Species (Short-beaked Echidna)
Pre-construction										
1	Avoid disturbance of sensitive habitats, including riparian corridors and wetlands, Semi-evergreen Vine Thicket and Brigalow communities, identified on Figure 2.	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Consider mechanisms to facilitate fauna movement through construction projects, such as retaining vegetated and riparian corridors.		✓	✓	✓	✓	✓	✓	✓	✓
3	Where possible, undertake vegetation clearing outside of breeding seasons and delay operations if breeding individuals or places are identified.	✓	✓	✓	✓		✓	✓	✓	✓
4	As part of the Ground Disturbance Process (GDP) at Hail Creek Mine, assessment of habitat will be undertaken in the planned work area. The GDP involves	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Controls/measures	Australian Painted Snipe	Glossy Black-cockatoo	Squatter Pigeon	Greater Glider	Koala	Ornamental Snake	Gliders	Micro-bats	SLC Species (Short-beaked Echidna)
	an initial inspection of the planned work area, during which, the following will be carried out: ▪ identification of ecological values, including potential animal breeding places (such as tree hollows and log piles), significant flora and fauna and sensitive areas ▪ assessment of vegetation and survey/demarcation of clearing boundaries ▪ identification of any other specific area or permit conditions.									
5	A pre-clearing survey will be undertaken prior to vegetation clearing in all identified potential breeding habitat areas, by a suitably licensed and experienced spotter/catcher. Pre-clearing survey protocols are provided in Appendix B.	✓	✓	✓	✓		✓	✓	✓	✓
6	Where occupied breeding places are identified, these are to be left undisturbed, marked and a buffer clearly established around this occupied breeding place. The buffer is to include the identified habitat/habitat tree and in the case of trees any surrounding trees whose canopy touches the habitat tree. A minimum 20 m buffer will be established for ground habitat features. The buffer is to remain in place to allow the breeding cycle to occur (i.e. young have fully fledged or left the breeding place). In these	✓	✓	✓	✓		✓	✓	✓	✓

	Controls/measures	Australian Painted Snipe	Glossy Black-cockatoo	Squatter Pigeon	Greater Glider	Koala	Ornamental Snake	Gliders	Micro-bats	SLC Species (Short-beaked Echidna)
	cases the construction schedule may need to be modified. Where large bat maternity or suspected maternity roosts are identified, e.g. in large stags, a larger buffer is to be established as determined by the spotter/catcher.									
7	Where possible, vegetated buffers of a minimum of 50 m shall be retained around wetland habitat (refer Figure 2). No disturbance of wetland habitat or this buffer shall occur and controls are to be installed to prevent unauthorised access into these areas.	✓					✓			
8	Large mature trees, particularly eucalypt and *Corymbia* species, must be marked and retained (where possible) to provide wildlife habitat.		✓	✓	✓	✓	✓	✓	✓	✓
9	Limits of clearing areas including 'no go zones' will be delineated with appropriate flagging material and/or barricade webbing as determined by the Environmental Specialist or Delegate.	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	Information regarding the risks of fauna injury and deaths and how to manage animals which are injured or displaced is to be included in HCM site inductions and in toolboxes.	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Controls/measures	Australian Painted Snipe	Glossy Black-cockatoo	Squatter Pigeon	Greater Glider	Koala	Ornamental Snake	Gliders	Micro-bats	SLC Species (Short-beaked Echidna)
11	Where temporary fencing is required, give consideration to fauna movement, current land uses and worker safety requirements.				✓	✓	✓	✓		✓
12	HCM is to have readily available details of veterinarians and/or wildlife carers in case of injury to animals during HCM activities.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vegetation Clearing										
13	Vegetation clearing protocols detailed in Appendix B are to be implemented during operations.	✓	✓	✓	✓		✓	✓	✓	✓
14	As part of routine pre-start meetings, work crews will be briefed on the locations of known or likely EVNT, Short-beaked Echidna or Colonial Breeding places and unauthorised access to relocation areas.	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	In the event of injury to fauna, these fauna will be taken to a nearby suitably qualified and experienced wildlife carer or veterinarian immediately for treatment.	✓	✓	✓	✓	✓	✓	✓	✓	✓
16	Signage should be erected to increase the general awareness of vegetation/habitat to be left undisturbed.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construction										
17	If possible there should be no general access to aquatic and wetland habitats (refer Figure	✓								

	Controls/measures	Australian Painted Snipe	Glossy Black-cockatoo	Squatter Pigeon	Greater Glider	Koala	Ornamental Snake	Gliders	Micro-bats	SLC Species (Short-beaked Echidna)
	2), particularly during nesting periods of wetland birds, i.e. spring and summer months.									
18	A reduced speed limit will be implemented in nominated areas (as identified as part of the pre-clearing surveys) with appropriate signage.			✓		✓	✓			✓
19	Dust suppression measures, such as watering, will be implemented as required, particularly during adverse (i.e. dry and windy) conditions.	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	To minimise erosion and sedimentation, sediment and erosion fencing shall be erected in areas of excavation/soil disturbance.	✓					✓			
21	Monitor the presence and spread of weeds, including aquatic weeds, in preferred habitats at HCM, i.e. all ponded areas, including but not limited to the northern dam, central wetland (Figure 2).	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Ensure trenches are backfilled as soon as possible to minimise the risk of fauna becoming trapped and injured. Leave branches and leaves in open trenches to allow fauna to escape or shelter.					✓	✓			✓

Controls/measures		Australian Painted Snipe	Glossy Black-cockatoo	Squatter Pigeon	Greater Glider	Koala	Ornamental Snake	Gliders	Micro-bats	SLC Species (Short-beaked Echidna)
23	Inspect trenches, culverts and other structures daily prior to works and again prior to backfilling. Any trapped or injured native fauna species present are to be managed appropriately.					✓	✓			✓
24	Where practicable cleared vegetation shall be stick raked into piles to provide fauna habitat. Note: this will be of most benefit if piles of cleared vegetation are located near retained vegetation.						✓			✓
25	Vehicle activities shall be restricted to roads, access tracks and hardened surfaces to reduce potential injury or death to fauna.	✓		✓		✓	✓			✓
26	In the event of injury to fauna, these fauna will be taken to a nearby suitably qualified and experienced wildlife carer or veterinarian immediately for treatment.	✓	✓	✓	✓	✓	✓	✓	✓	✓
27	If barbed wire must be used in project fencing, replacing the top strand with plain fencing wire will reduce the risk of fauna injury and death.				✓	✓		✓		✓
28	Temporary lighting shall be directed away from retained habitat. Light shades and low lighting must be applied to construction and operational areas where located adjacent to retained habitats.	✓	✓	✓	✓	✓	✓	✓	✓	✓

4.1 Responsibility

This SMP must be implemented as part of contracts at HCM, where vegetation clearing or other activities may result in the tampering with an animal breeding place.

The Environmental Specialist is to notify DES where breeding places of species that might have heightened community interest are identified.

All HCM employees, contractors or other agents are required to operate in accordance with this SMP at HCM.

The Environmental Specialist is required to ensure compliance with this SMP and that corrective action is implemented where non-compliance is identified.

4.2 Reporting

A register of tampering with animal breeding places must be maintained (the Register).

All spotter/catcher activities are to be recorded in the Register, including:

- dates, location and duration of survey and persons involved
- survey methods employed
- records of all hollow bearing trees, nests and other breeding sites, including GPS location and number and type of hollows.
- proposed number and location of nest boxes or relocated hollows, as deemed appropriate by the spotter/catcher and at the time of survey
- results of active search results for EVNT species
- results of any hollow bearing tree inspections
- a record of all fauna encountered and relocated, including the location of an EVNT species
- details of the location of buffer zones established, shown on a 'mud map' of the clearing area
- details of the outcomes of all fauna encountered, including relocation sites.

The Register is to include the number of obvious animal breeding places destroyed and incidences of animal injury or death. The Register is to include as a minimum the following information:

- date and time
- location of breeding place (GPS coordinate, Lot and RP)
- description of species and breeding place
- description of tampering/disturbance
- measures taken to avoid tampering/disturbance
- authorised person responsible for tampering
- details of suitably qualified and experienced spotter/catcher and wildlife carer involved in the recovery or relocation of the animal

- location and description of the area for relocation (if applicable)
- outcomes of monitoring activities (if applicable).

Details of non-compliance are to be recorded in the Register. The Register will be:

a) made available to DES upon request; and
b) provided to DES at wildlife@des.qld.gov.au by the approved entity within 6 months of the interactions with the high risk of impacts SMP species and the complete register within 10 business days after the expiry of this SMP

4.3 Monitoring

Where relocation of breeding places or implementation of artificial breeding places has been implemented, the following monitoring is to be undertaken:

- daily for 72 hours post relocation/release. If relocation/release is considered unsuccessful, the animal is to be transferred to a suitably qualified wildlife carer for rehabilitation/medical attention
- fortnightly monitoring for a period of one month
- follow up monitoring 6 months after the relocation/release.

Where occupied EVNT, colonial breeding or special least concern breeding places have been identified and buffers established, these breeding places are to be monitored as follows:

- daily during surrounding vegetation clearing or other disturbance activities are taking place
- fortnightly until the breeding cycle is completed and the young have fully fledged
- more regularly if breeding animals or young are suspected to have been adversely affected by vegetation clearing and construction activities and may need to be removed into veterinarian care.

Monitoring activities are to be undertaken by a suitably qualified and experienced spotter/catcher or wildlife carer. If monitoring activities are considered to be interfering with the animal's recovery or breeding activities, this monitoring is to be delayed for an appropriate period of time.

4.4 Non-compliance

In instances of non-compliance, the incident is to be investigated by the Environmental Specialist, this SMP reviewed and updated where necessary and corrective action implemented.

Incident and non-compliance investigation is to be managed in accordance with Glencore's Incident Management Manual - GCAA-625378177-10844.

Details, investigative activities and outcomes are required to be reported in the Register.

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Figures

Figure 1: Location of Hail Creek Mine

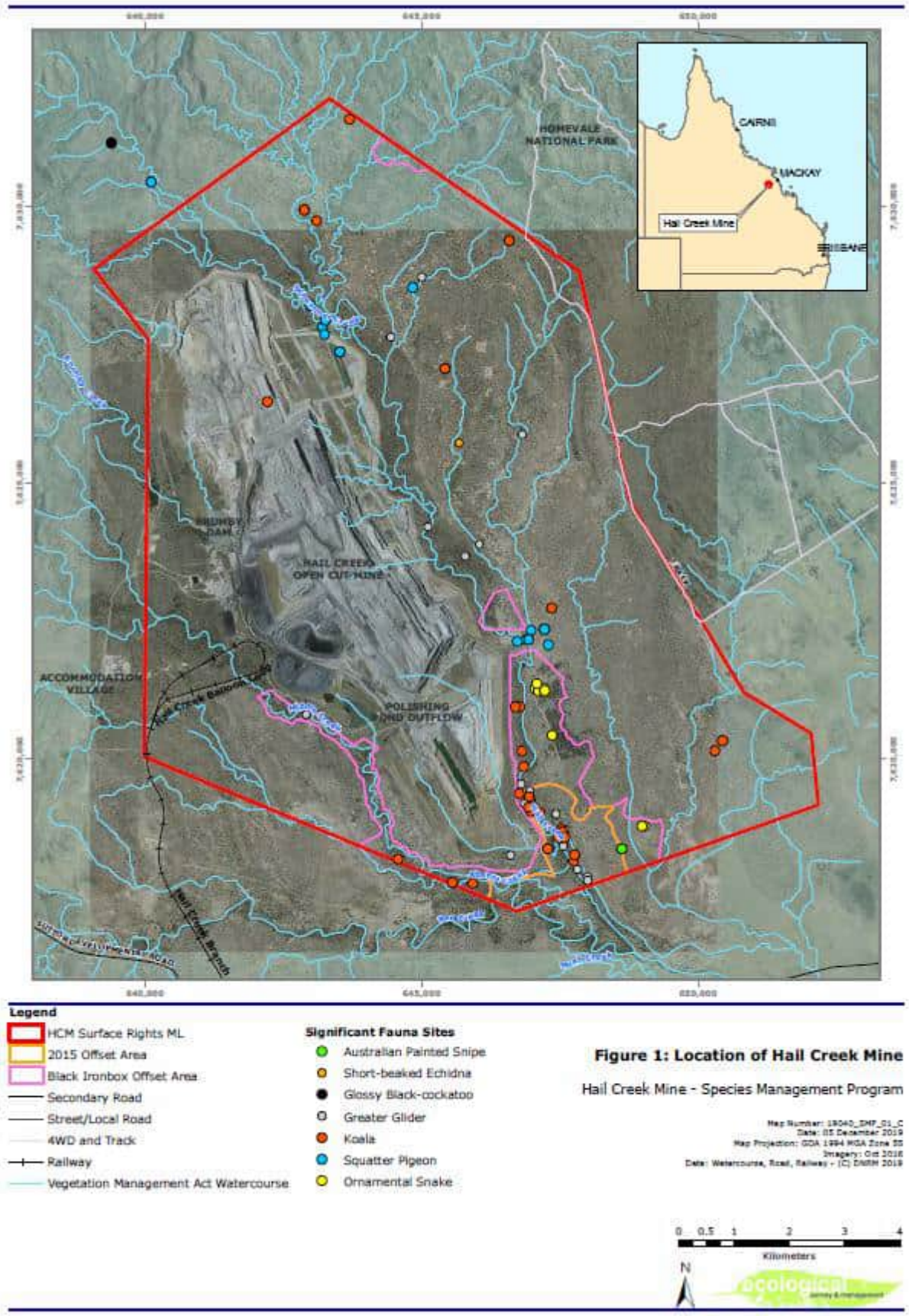
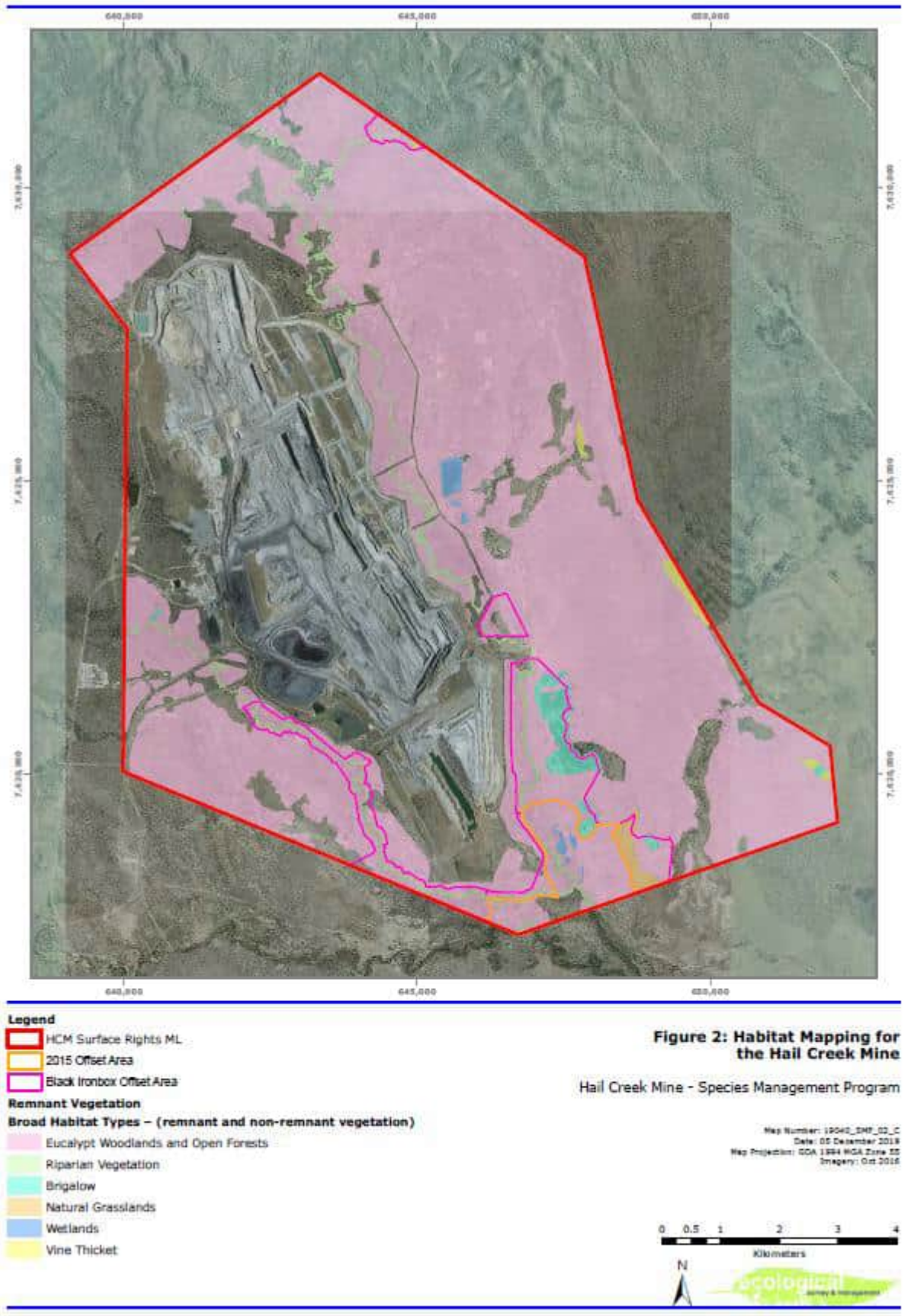


Figure 2: Habitat mapping for the Hail Creek Mine



APPENDIX A

Previous ecological studies undertaken at HCM

Pre-mining Studies

- Environmental Research and Education (1996), Hail Creek Coal Project: Fauna Survey
- Elsol (1996), Hail Creek Project Vegetation Study
- Patterson (1998), Results of survey of potential roosting sites of little pied bats on Brumby Creek, Hail Creek Mine proposed pit area
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Hail Creek Expansion Studies

- URS (2005), Nature Conservation Survey and Potential Impacts – Hail Creek Further Development Project, 19 August 2005
- URS (2006), Hail Creek Further Development Project Environmental Assessment Report.

Post Development Studies

- Ecotone Environmental Consultants (2008), Assessment of Regional Ecosystem Mapping and *Eucalyptus raveretiana* for a proposed Co-disposal area at the Hail Creek Mine, Central Queensland
- Footprints Environmental Consultants (2009a), First Monitoring Survey Event for the Ornamental Snake (*Denisonia maculata*) and Little Pied Bat (*Chalinoloous picatus*) on Hail Creek Mine
- Footprints Environmental Consultants (2009b), Biodiversity Values Assessment of Remnant Habitats supported within the Hail Creek Mining Lease
- Footprints Environmental Consultants (2009b), Biodiversity Values Assessment of the Lot 13 Property, WHS 466
- SKM (2010), Hail Creek Mine, 2009 Biodiversity Monitoring
- JKR Ecological (2011), RTCA Hail Creek Mine – Annual Threatened Fauna Monitoring, 2010
- Ecological Survey & Management (2012a), Annual Threatened Fauna Monitoring
- Ecological Survey & Management (2011a), HCM BioCondition Monitoring Report 2011
- Ecological Survey & Management (2011b), HCM Rehabilitation BioCondition Monitoring Report 2011
- Ecological Survey & Management (2011c), Targeted threatened flora surveys in semi-evergreen vine thicket communities in Lot 13

- Ecological Survey & Management (2011d), *Eucalyptus raveretiana* (Black Ironbox) Monitoring Program, 2011 Draft Report
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- Ecological Survey & Management (2015), Hail Creek Transition Project Terrestrial Ecology Assessment Report.
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- Ecological Survey & Management (2016), Hail Creek Mine Offset Area 2015 Baseline Fauna Survey
- Ecological Survey & Management (2017), Hail Creek Mine Black Ironbox Baseline Monitoring
- Ecological Survey & Management (2017), Hail Creek Mine Black Ironbox Offset Area 2017 Baseline Fauna Survey
- Ecological Survey & Management (2017), Hail Creek Mine Biodiversity Offset Area Fauna Monitoring Survey
- Ecological Survey & Management (2018), Hail Creek Mine Black Ironbox Offset Area Ecological Baseline Monitoring
- Ecological Survey & Management (2018), Hail Creek Mine Black Ironbox Offset Area 2018 Fauna Monitoring
- Ecological Survey & Management (2019), Hail Creek Mine Black Ironbox Offset Area Ecological Monitoring
- Ecological Survey & Management (2019), Hail Creek Mine Black Ironbox Offset Area 2018 Fauna Monitoring
- Ecological Survey & Management (2019), Hail Creek Mine 2015 Offset Area Ecological Monitoring – 2019
- Ecological Survey & Management, Fauna spotter-catcher activities between 2012 - 2019

APPENDIX B

Fauna and breeding place management protocols

Fauna and breeding place management protocols

The following protocols have been developed to avoid and reduce the risk of impacts to fauna and animal breeding places during vegetation clearing activities at Hail Creek Mine.

Pre-clearing surveys

Pre-clearing surveys shall be undertaken by a suitably licensed and experienced spotter/catcher prior to commencement of vegetation clearing and during vegetation clearing. The purpose of these pre-clearing surveys is to identify animal breeding places within the planned area of clearing and avoid and reduce impacts to these animal breeding places.

Pre-clearing surveys shall include the following actions at a minimum:

- identification and marking of any potential breeding places requiring careful removal or further attention (i.e. inspection with an elevated work platform) in the field and on construction environmental management plans
- binocular search of the vegetation present to locate active bird nests, possum drays, previously accessed termite mounds and other habitat features such as log piles
- active searching of logs, leaf litter, termite nests and debris for EVNT species
- inspection of trees to locate and identify hollows or potential features for hidden hollows
- inspection of bird nests to determine presence/absence of eggs or chicks. This can be achieved via direct observation with binoculars
- recording the location of all hollow-bearing trees, log piles, nests and other breeding sites using a GPS, features of tree hollows (diameter, number and whether active/inactive) shall be recorded
- relocation of confirmed breeding places where possible, as well as salvage and relocation of potential breeding micro-habitat.

Vegetation clearing protocols

The following protocols shall be implemented during clearing activities.

<u>General measures:</u>

- In identified potential breeding habitat, spotter/catchers are to walk ahead of clearing (at a safe distance) in order to relocate nesting places or eggs and to encourage the natural relocation of resident reptiles. Where it is not possible to relocate eggs, these should be handed over to a suitably qualified and experienced wildlife carer/facility for incubation.
- The spotter/catcher will then check cleared areas to recover injured animals for transport to a wildlife carer or veterinarian.
- Where practicable, vegetation clearing is to be undertaken in a sequential manner and in the direction of vegetation to be retained to direct escaping

wildlife away from clearing and roads, into adjacent native vegetation or other natural areas.

- Where identified during vegetation clearing activities, all EVNT, Short-beaked Echidna and Colonial Breeding species are to be relocated to nearby suitable habitat to be retained, if appropriate within an offset area, by the fauna spotter/catcher or taken to the closest wildlife carer/facility if necessary.
- In the case of a Koala, clearing activities will be halted immediately. A buffer will be established that includes the Koala tree and all neighbouring trees with overlapping canopies. The Koala will be given the opportunity to leave the area of its own volition (generally overnight). Clearing will not recommence until the Koala has moved on from the disturbance footprint.

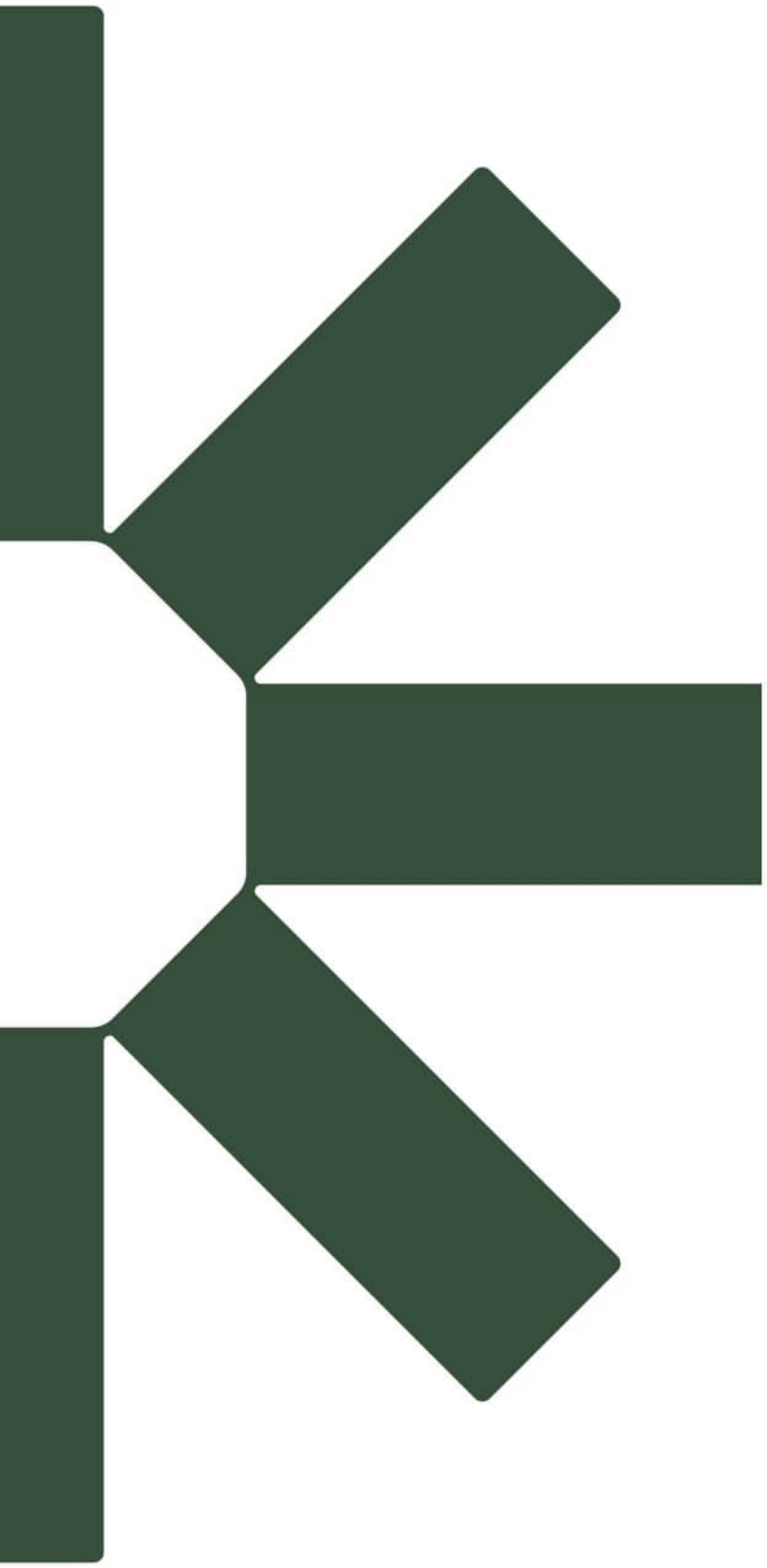
Relocation of breeding places:

- Where unoccupied breeding places are identified, the relocation of the breeding structure is required where feasible. If this is not possible an alternative artificial structure should be placed in nearby undisturbed habitat, preferably within one of the offset areas.
- Relocated breeding places are to be retained intact to the extent possible. The site of relocation is to replicate the height and orientation of the original breeding or nesting structure as far as is possible. Sections of hollow branch or log should be secured in the new location by mechanical means deemed appropriate by the fauna spotter/catcher, e.g. bolts, metal bands. Relocation is to be undertaken under the supervision of an approved fauna spotter/catcher and as close as possible to dusk.
- If a breeding place cannot be relocated the breeding place will be replaced with an artificial nesting structure at a ratio of 1:1 utilising current best practice nest box design.
- Controls are to be installed to prevent unauthorised access into relocation areas.

Hollow-bearing tree protocols:

- Where removal of hollow-bearing trees or log piles is required, the use of hard felling processes using chain saws, mega mulchers and bulldozers should be avoided where possible to minimise the destruction of hollows and potential injury to wildlife. Instead these trees can be felled using a tree grab that can remove the tree in a controlled fashion, particularly dead trees or trees with large trunk hollows.
- Prior to felling, where possible, hollow entrances are to be blocked using buffer rags and the hollow removed from the tree prior to felling, and relocated, preferably into one of the two offset areas within the HCM ML.
- Where hollow salvage and relocation is not possible prior to felling, the tree should be knocked at the base to encourage fauna to relocate of their own accord. Once the tree is felled, injured fauna can be rescued and taken to a wildlife carer or veterinarian. Otherwise, hollow entrances should be blocked on the felled tree, the hollows removed from the tree and relocated. Where extensive damage has occurred to the felled hollow, the fauna should be relocated into an artificial nest box.

- If possible and safe to do so, hollow trees should be felled at dusk to allow fauna present, particularly bats, the opportunity to disperse without the presence of diurnal predators such as butcherbirds, kites and currawongs. These trees should be felled away from hollow openings.
- The fauna spotter/catcher is to inspect all hollows, nests and habitat post felling, using a borescope where necessary and any injured fauna is to be taken to a wildlife carer/facility or veterinarian.



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