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Disturbance Limits Approach:

Tarrawonga Coal Mine

Prepared for: Tarrawonga Coal Pty Ltd

16 August 2021

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AUTHOR/S	Lucas McKinnon and Darren James (DAJ Environmental)	
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Glossary and abbreviations

ACRONYM	DESCRIPTION
BBS	Brigalow Belt South
BMP	Biodiversity Management Plan
CEEC	Critically Endangered Ecological Community
DA	Development Application
EPBC	Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LP	Liverpool Plains
MNES	Matter of National Environmental Significance
NSW	New South Wales
PA	Project Approval
TCPL	Tarrawonga Coal Pty Ltd

1. Introduction

1.1 Purpose of this report and legislative context

Conditional approval for the expansion of Tarrawonga coal mine was granted on 11 March 2013 (Tarrawonga Coal Mine Extension, NSW [EPBC2011/5923]) by the Commonwealth Government. Condition 3 (a & b) of the approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (**Table 1.1**), requires that the person taking the action must:

- Limit the maximum disturbance for a range of Matters of National Environmental Significance (MNES) values being impacted by the proposed extension
- Provide an independent analysis that demonstrates the maximum disturbance limits which will minimise impacts on the relevant MNES.

Table 1.1: Summary of condition 3a and 3b (EPBC 2011/5923).

Condition 3: The person taking the action must submit to the Minister for approval within three months of commencement of construction, an approach that:		*Section in this report where condition is met*
a	*Limits the maximum disturbance (in hectares) specified for each of the years 5, 10, 15 and 17 from the date of this approval of the White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community and the habitat or potential habitat for the regent honeyeater, swift parrot and greater long-eared bat*	*Section 3.2; Section 4*
b	*Incorporates an analysis, undertaken by independent ecological experts approved by the Department, that demonstrates the maximum disturbance limits which will minimise any impacts on relevant matters of national environmental significance*	*Section 3.1; Section 4*
c	*demonstrates collaboration with the person taking the action to develop and operate the Boggabri Coal Project (EPBC 2009/5256) and the person taking the action to develop and operate the Maules Creek Coal Project (EPBC 2010/5566), in order to minimise progressive project area disturbance limits across all three sites. The progressive disturbance limits are to be reflected in the development of the Leard Forest Mining Precinct Biodiversity Strategy*	*Evidence of collaboration to be provided by Whitehaven Coal Limited. Not discussed in this DLA*

This report has been prepared to satisfy condition 3a and 3b by:

(1) providing an analysis that demonstrates the maximum approved disturbance limits which aim to minimise impacts on relevant MNES, and

(2) identifying the maximum disturbance anticipated for years 5, 10, 15 and 17. The report has been prepared to include only those MNES relevant to the Project, including:

- The ecological community known as White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community (referred to in this report as Box-Gum Grassy Woodland) – critically endangered

- Potential habitat for Regent Honeyeater (*Anthochaera phrygia*) – critically endangered
- Potential habitat Swift Parrot (*Lathamus discolour*) – critically endangered
- Potential habitat Greater Long-eared bat (South-eastern Long-eared bat) (*Nyctophilus corbeni*) – vulnerable

Ecoplanning previously prepared a DLA in January 2020 (Ecoplanning 2020) for the Tarrawonga Coal Mine extension. The DLA was subsequently approved by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) in March 2020.

Since this time the Tarrawonga Coal Mine NSW Project Approval 11_0047 Modification 7 was approved to remove mining into the Upper Namoi Alluvium. Therefore the EPBC DLA disturbance boundaries needed to be aligned with the state approval which resulted in an additional ~140m extension to the east, thus requiring an update to the DLA (this report). It is noted, however, that the new 2021 extension boundary assessed in this DLA remains smaller than the original proposed boundary of disturbance.

Consistent with the previous DLA (Ecoplanning 2020), in satisfying Condition 3a and Condition 3b an assessment of the total amount of impact associated with the approval has been completed. The amount of habitat available for each MNES, within the surrounding 'region', has also been calculated. The following tasks have been undertaken as part of the project:

- Literature review to determine the amount of disturbance approved for each MNES as part of the extension
- Confirmation of the extension disturbance footprint assessed in the original impact assessment for each MNES
- Confirmation of any changes to the extension disturbance footprint, and calculation of the new area of disturbance proposed
- Calculation of the area of available habitats for each MNES in the surrounding Interim Bioregionalisation of Australia (IBRA) region and subregion using best available data and information.

Using the above information, the maximum disturbance limits for each MNES were assessed and their suitability reviewed.

1.2 Background

The Tarrawonga Coal Mine (Tarrawonga), managed by Whitehaven Coal Mining Limited, is located approximately 15 km north east of Boggabri and 42 km north west of Gunnedah (**Figure** 1.1 and **Figure 1.2**) in the state of NSW (ELA 2015). The site is located partially within the boundaries of Leard State Forest and is situated wholly within the Narrabri Local Government Area (LGA). Mining operations are undertaken by Tarrawonga Coal Pty Ltd (TCPL) (ELA 2015).

The mine commenced operations in 2006, known then as East Boggabri Coal Mine (ELA 2015). Since that time an extension within Mining Lease (ML) 1579 was granted (2010 - DA 88-4-2005 MOD 1) (ELA 2015), with conditional approval also granted for a subsequent proposed extension (the subject of this report - NSW State Government (PA 11_0047) and Commonwealth Government (EPBC 2011/5923)) (ELA 2015). Construction of the current expansion of Tarrawonga commenced in March 2014.

1.2.1 Approved clearing

Maximum clearing limits for each MNES are set in the Commonwealth Government's approval (EPBC 2011/5923). Conditions 1 and 2 of EPBC 2011/5923 allow TCPL to complete the following clearing as part of the current extension:

1. The person taking the action must not clear more than 13 ha of the EPBC listed White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community within the Tarrawonga Coal Extension project area;

2. The person taking the action must not clear more than:

a) 279 ha of habitat for the Regent Honeyeater (Anthochaera phrygia: formerly Xanthomyza phrygia)
b) 54 ha of habitat for the Swift Parrot (Lathamus discolor)
c) 334 ha of habitat for the South-eastern Long-eared Bat (Nyctophilus corbeni)
within the Tarrawonga Coal Extension project area.

This report reviews the maximum allowable clearing limits displayed above to determine their suitability and compares these against the newly prepared extension footprint supplied by TCPL.

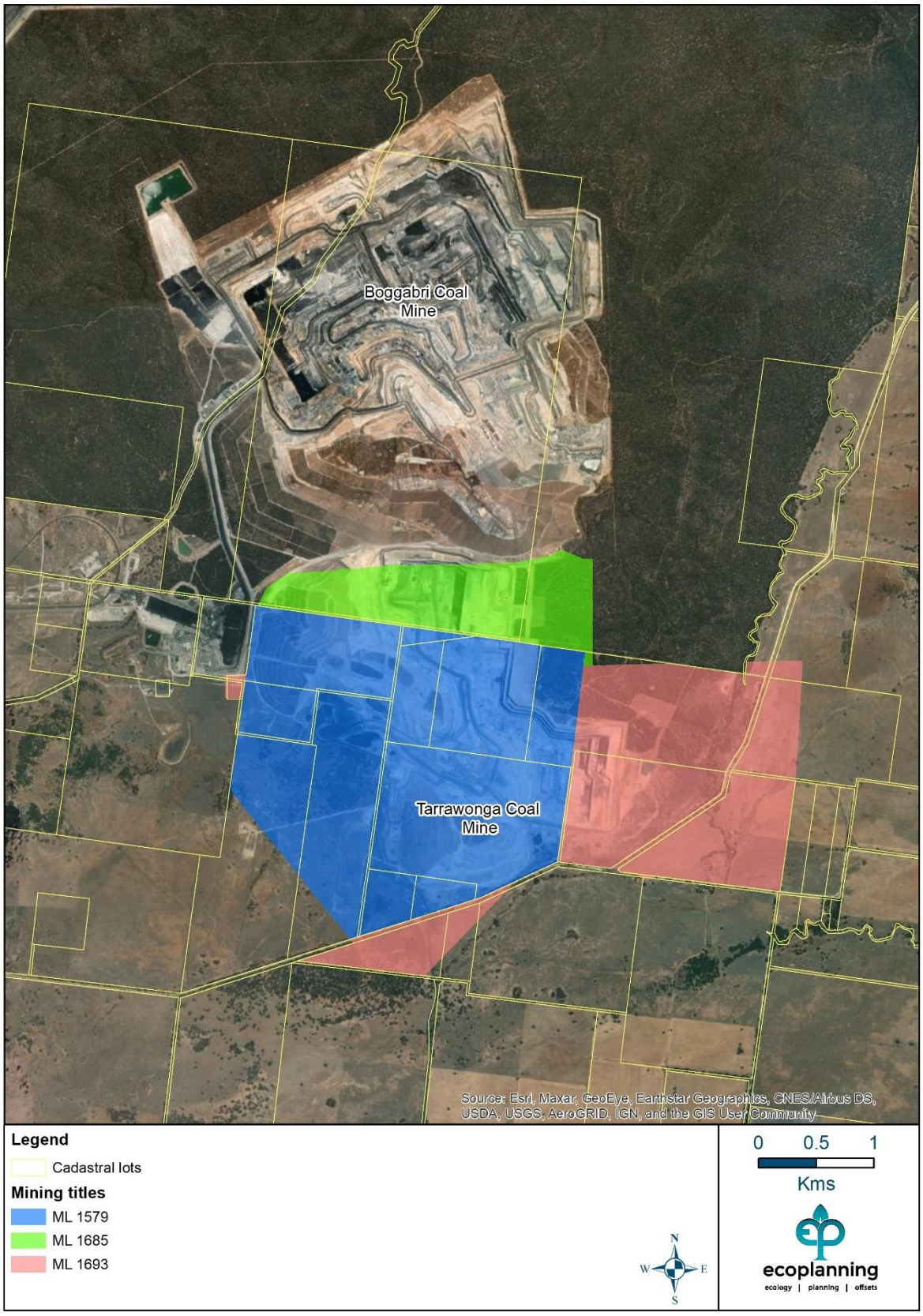

Figure 1.1: Tarrawonga Coal Mine.

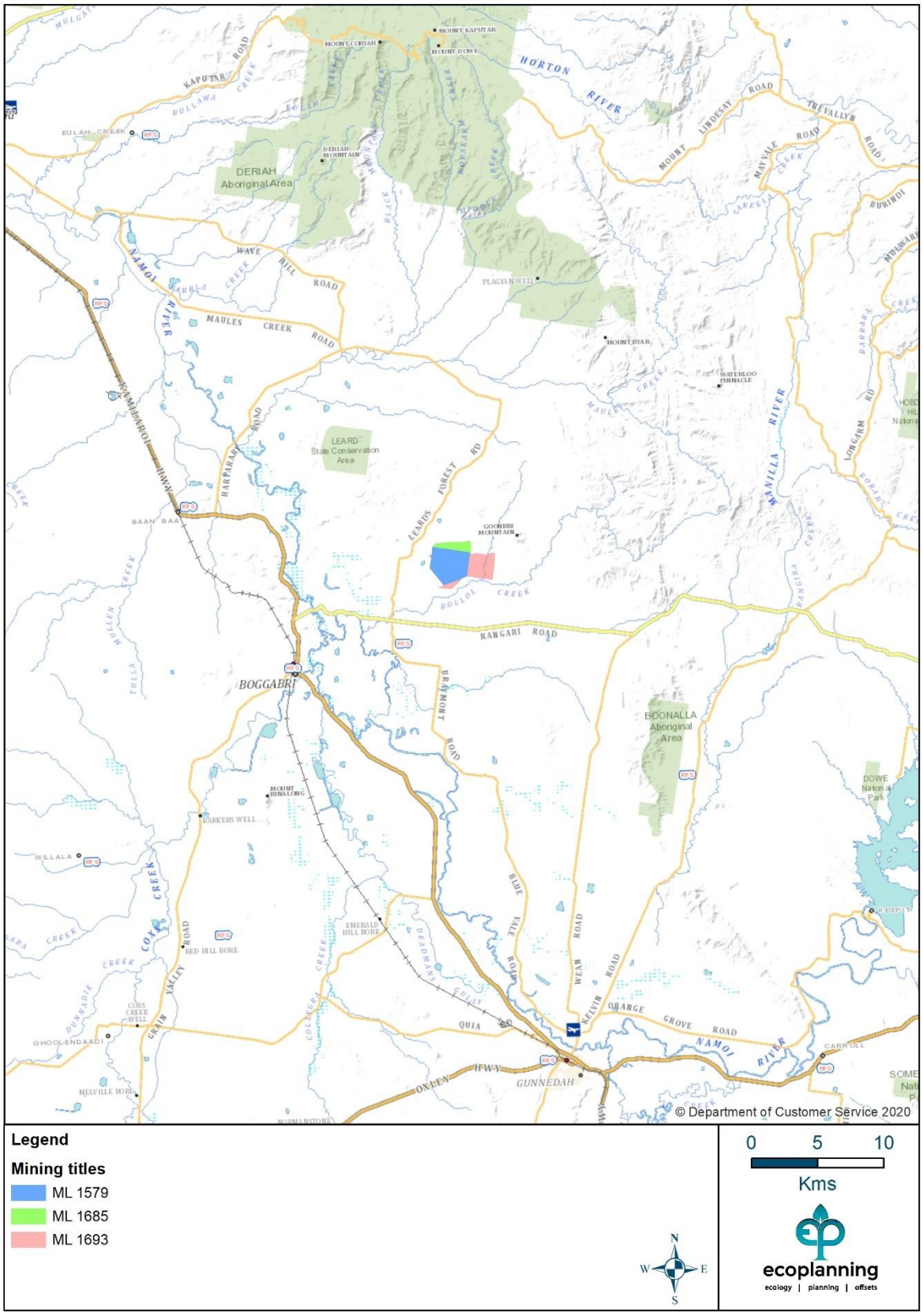

Figure 1.2: Tarrawonga Coal Mine locality.

1.2.2 Mine site rehabilitation

TCPL propose to undertake staged rehabilitation and revegetation, which follows the annual clearing within the project area. The progressive rehabilitation will allow for both woodland/forest associations and agricultural land, which contain predominantly native grasses (RSCES 2011).

The goal of the rehabilitation is to create landforms that are safe, stable and non-polluting, with the rehabilitation aiming to restore native vegetation and fauna habitat through assisted natural regeneration, targeted vegetation establishment and introduction of fauna habitat features (Whitehaven Coal 2020b). In total 752 ha of woodland and forest will be established (Whitehaven Coal 2020b). Woodlands and forests will consist of the following vegetation types that occur in the Project area (Whitehaven Coal 2020b):

- White Box - Narrow-leaved Ironbark - White Cypress Pine grassy open forest;
- White Box – White Cypress Pine shrubby woodland;
- White Box – White Cypress Pine grassy woodland;
- Pilliga Box - Poplar Box - White Cypress Pine Grassy Open Woodland;
- Bracteata Honey Myrtle Low Riparian Forest; and
- Derived Native Grasslands.

Consistent with Condition 23 of Commonwealth approval EPBC 2011/5923, no less than 13 ha of Box-Gum Woodland EEC will be revegetated (Whitehaven Coal 2020b).

The proposed timing of rehabilitation is provided in **Table 1.2**. In addition to the 752 ha of woodland and forest the final rehabilitated landform will also include agricultural land and the final void. Data is presented for the 2019, 2023, 2029 and 2030 calendar years.

Table 1.2: Proposed timing of rehabilitation (provided by Tarrawonga Coal 2021).

EPBC Year	Calendar Year	Cumulative rehabilitation area (ha)
Year 6	2019	107
Year 10	2023	220
Year 16	2029	587
Year 17	2030	1,028

2. Methods

2.1 Literature and data review

A literature and data review was undertaken to obtain quantitative data for the impact calculations and the regional vegetation and species habitat assessment. The documents reviewed are listed below:

- Tarrawonga Coal Project Environmental Assessment:
  - Appendix E - Fauna Assessment, including Attachment E Willeroi Fauna Report (RSCES 2011)
  - Appendix F - Flora Assessment, including Attachment C Offset Strategy (FloraSearch 2011b)
- Tarrawonga Coal Mine Biodiversity Management Plan (Whitehaven Coal Limited 2020a)
- Tarrawonga Coal Mine Site Rehabilitation Plan (Whitehaven Coal Limited 2020b)
- Mining Operations Plan: Tarrawonga Coal Mine. 1 November 2015 to 30 December 2020 (SLR 2015)
- Biodiversity Offset Management Plan: Whitehaven Regional Biodiversity Offset Site (Eco Logical Australia 2013)
- Tarrawonga Coal Mine White-box Yellow-box Blakely's Red-gum Woodland Endangered Ecological Community: Implementation Plan (Whitehaven Coal Limited 2015)
- EPBC Act Assessment of the Impact on *Tylophora linearis* through the Loss of Habitat Associated with Tarrawonga Open Cut Coal Mine (Hunter Eco 2016)
- Tarrawonga Coal Mine Life of Mine Modification – Modification Report (Whitehaven Coal 2019)
- Threatened Biodiversity Data Collection (EES 2021) and BioNet Vegetation Classification (EES 2021) to identify PCT associations for the threatened species and possible extent of Box Gum Woodland

2.2 Impact calculations

An assessment of the amount of each MNES to be impacted was conducted as part of this assessment.

The '*original extension footprint'* (EPBC 2011/5923) is shown in **Figure 2.1**. Since conditional approval was granted, the area to be impacted by the Project has been refined, with the impact area reduced compared to the original boundary.

As described above, this DLA supersedes the previous DLA (Ecoplanning 2020), with the 2021 footprint extending east (by approximately 140 m) compared to the 2020 footprint previously assessed to align with the Tarrawonga Coal Mine NSW Project Approval 11_0047 Modification 7 boundary. As previously noted, the new 2021 extension boundary assessed in this DLA remains smaller than the original proposed boundary of disturbance.

The '*2021 extension footprint*' was provided by TCPL for 2018 (year 5), 2023 (year 10), 2028 (year 15) and 2030 (year 17) (**Figure 2.1**). Note that no clearing takes place between year 15 and year 17, therefore 2028 and 2030 are combined into a single polygon for mapping purposes. The '*previously approved surface disturbance*' is also displayed in **Figure 2.1**. The vegetation cleared within this area is not subject to this DLA.

The area of disturbance located to the north of the 2021 extension footprint is associated with Boggabri Coal Mine and is not part of this DLA. Rehabilitation of this area will be conducted by TCPL to integrate the final landform between the two mines.

The 2021 extension footprint has been analysed against the potential habitat and vegetation mapping within the extension footprint to provide disturbance amounts for the project for each MNES. The areas disturbed using the 2021 extension footprint have then been compared to the maximum area approved to be cleared under EPBC 2011/5923, which was based on impacts expected using the original extension footprint. The updated impact calculations are presented in **Section 3** for each MNES. As with the 2020 DLA (Ecoplanning 2020), in all cases the area to be cleared for each MNES is less than the maximum disturbance limit identified in EPBC 2011/5923.

To complete the assessment GIS analysis was conducted to calculate the area of each MNES impacted within the 2021 extension footprint provided. In order to calculate the area of MNES impacted the existing vegetation map produced for the project site (FloraSearch 2011a) was combined with the 2021 extension footprint provided by TCPL, and the area of vegetation or potential habitat within the 2021 extension footprint calculated. Each MNES was then associated with one or more mapped vegetation types.

Table 2.1 provides the associations for the impact site for the 2021 extension footprint. Note, the associations used are identical to those used for the environmental assessment prepared for the project (FloraSearch 2011a and 2011b).

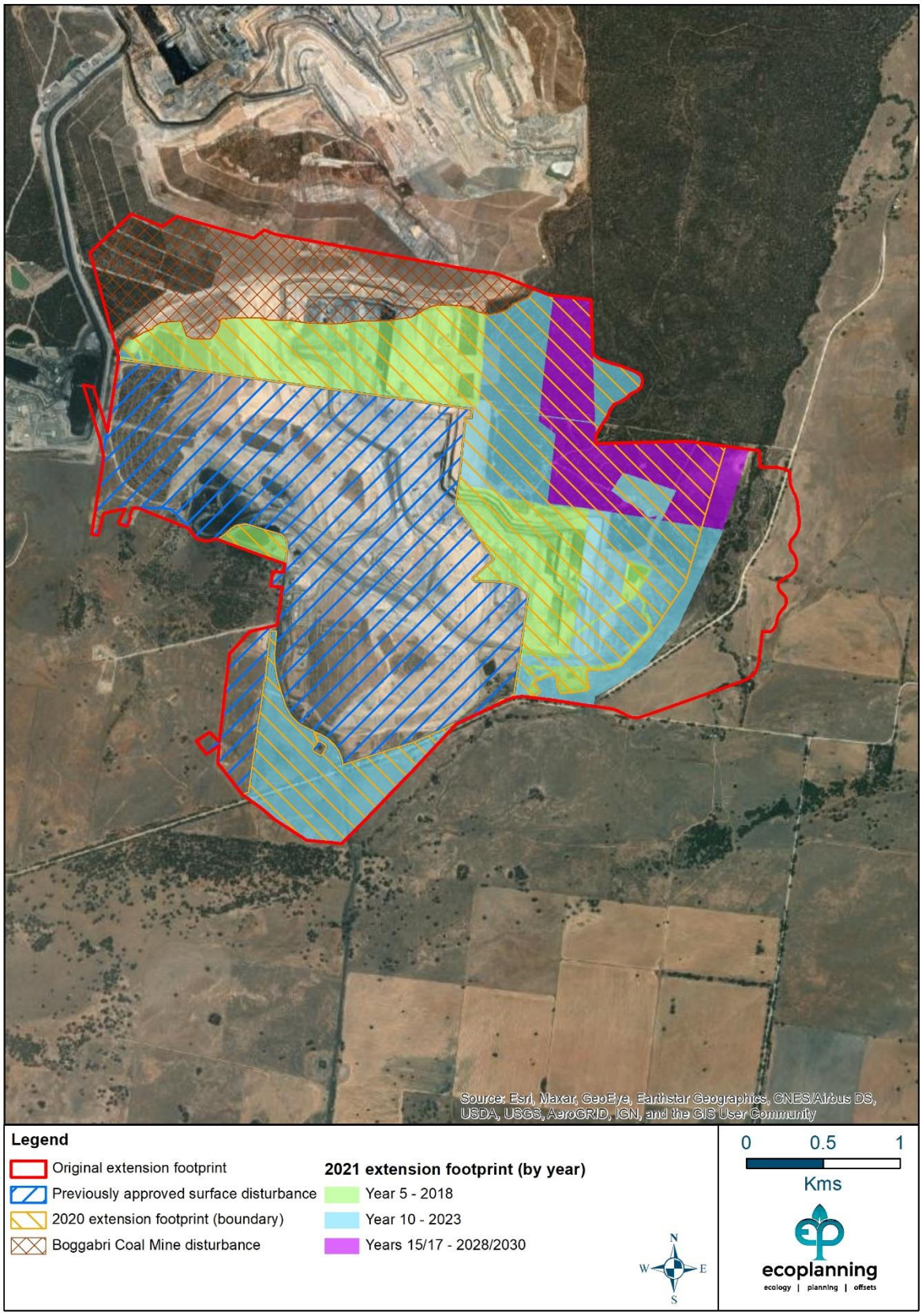

Figure 2.1: Original extension footprint, the 2020 extension footprint and 2021 extension footprint.

Table 2.1: MNES vegetation and habitat associations within the Project site.

Vegetation code	Vegetation type and condition class	Swift Parrot	Regent Honeyeater	South-eastern Long-eared Bat	Box-Gum Grassy Woodland
1	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest		Y	Y	
1a	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest - White Cypress Pine regeneration			Y	
1b	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest - Regeneration		Y	Y	
2	White Box - White Cypress Pine shrubby woodland	Y	Y	Y	
2b	White Box - White Cypress Pine shrubby woodland – Semi-cleared and regenerating	Y	Y	Y	
3	White Box - White Cypress Pine grassy woodland	Y	Y	Y	Y
3a	White Box - White Cypress Pine grassy woodland - White Cypress Pine regeneration	Y	Y	Y	Y
3b	White Box - White Cypress Pine grassy woodland – Semi-cleared and regenerating		Y	Y	Y
3c	White Box - White Cypress Pine grassy woodland - Derived Native Grassland				Y
4	Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland		Y	Y	
5	Bracteate Honeymyrtle low riparian forest		Y	Y	

2.3 Regional species habitat assessment

The available potential habitat for Regent Honeyeater, Swift Parrot and South-eastern Long-eared Bat was calculated for the Liverpool Plains (LP) IBRA subregion and the Brigalow Belt South (BBS) IBRA region. The total area of the LP IBRA subregion is approximately 941,752 ha, and is within the larger BBS IBRA region which covers approximately 5,623,054 ha.

Best available vegetation data was sourced from the SEED portal (https://www.seed.nsw.gov.au/) for the LP and BBS IBRA region. Layers sourced include three vegetation maps prepared as part of the State Vegetation Type Map, specifically:

- Border Rivers Gwydir / Namoi Region Version 2.0 (VIS 4467)
- Central West / Lachlan Region Version 1.4 (VIS 4468) and
- Western Region v1.0 (VIS 4492)

The south eastern corner of the BBS was not covered by a layer from the State Vegetation Type Map, therefore the Greater Hunter Native Vegetation Mapping v4.0 (VIS 3855) was used.

The four regional vegetation maps were combined in ArcGIS and the seamless layer clipped to the BBS IBRA region boundary. Species associations to mapped Plant Community Types (PCTs) were then made based on the data contained in the Threatened Biodiversity Data Collection (EES 2021), with each mapped vegetation community categorised either as 'habitat listed in profile' or 'not habitat'. Further assessment was then done for each species to determine which subregions within the BBS each species was likely to be found, again based on data from the Threatened Biodiversity Data Collection (EES 2021).

The area of impacted potential habitat (both for the maximum area approved to be cleared (EPBC 2011/5923) and the 2021 extension footprint) was then assessed against the amount of potential habitat mapped in both the LP IBRA subregion and the BBS IBRA region.

A similar approach was adopted for mapping Box-Gum Grassy Woodland, with vegetation associations contained within the BioNet Vegetation Classification (EES 2021) used to identify those PCTs which are potentially consistent with White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland within the compilation vegetation data set. Note that, due to limitations in the vegetation mapping used, no identification of DNG was possible within the broader IBRA region or subregion.

3. Results

3.1 Disturbance limits assessment

As outlined in Section 1, conditions 1 and 2 of EPBC 2011/5923 allow TCPL to complete the following clearing within the Tarrawonga Coal Extension project area as part of the current extension:

- 13 ha of the EPBC listed White Box—Yellow Box—Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Grassy Woodland)
- 279 ha of habitat for the Regent Honeyeater
- 54 ha of habitat for the Swift Parrot
- 334 ha of habitat for the South-eastern Long-eared Bat

To compare the above maximum disturbance limits to what is now proposed, the 2021 extension footprint provided by TCPL for 2018 (year 5), 2023 (year 10), 2028 (year 15) and 2030 (year 17) was analysed against the habitat mapping available for the mine extension. For reference the total area of mapped habitat for each species is:

- Box-Gum Grassy Woodland – 12.9 ha
- Regent Honeyeater – 272.2 ha
- Swift Parrot – 53.4 ha
- South-eastern Long-eared Bat – 327.1 ha

Table 3.1 provides a summary of the analysis results for each clearing period, and provides the total area of clearing for each MNES in years 5, 10 and 15/17. The total clearing calculated is:

- Box-Gum Grassy Woodland – 12.9 ha
- Regent Honeyeater – 249.1 ha
- Swift Parrot – 53.4 ha
- South-eastern Long-eared Bat – 304.0 ha

Typical of mining expansions, proportionally more vegetation clearing occurs in earlier years than later years. Note, due to habitat for MNES overlapping in some locations, the statistics in **Table 3.1** cannot be summed to provide a total impact amount.

Table 3.1: Summary of MNES clearing, by year, for the proposed mine extension (2021 extension footprint).

MNES	2018 (Year 5)*	2023 (Year 10)*	2028/30 (Years 15/17)*	Total area of clearing (ha)*
Box-Gum Grassy Woodland	6.2	6.7	0	12.9
Regent Honeyeater	132.3	76.7	40.1	249.1
Swift Parrot	48.7	4.7	0	53.4
South-eastern Long-eared Bat	132.6	104.2	67.2	304.0

* Cannot be summed to calculate a total area of clearing as clearing overlaps in some cases.

A comparison of the proposed clearing against the maximum disturbance limits identified in conditions 1 and 2 of EPBC 2011/5923 was undertaken, with the results displayed in **Table** 3.2. For all MNES the total clearing now calculated is less than the maximum disturbance limit set by conditions 1 and 2 of EPBC 2011/5923.

Table 3.2: Comparison of maximum disturbance limits and proposed area of clearing for MNES.

MNES	Area of clearing in year 5, year 10 and year 15/17 from proposed Tarrawonga Mine extension (2021 extension footprint)				Maximum disturbance limit (ha)*	Difference between proposed area of clearing (2021 extension footprint) and max. disturbance limit (ha)*
	2018 (Year 5)*	2023 (Year 10)*	2028/30 (Years 15/17)*	Total area of clearing (ha)*		
Box-Gum Grassy Woodland	6.2	6.7	0	12.9	13	**-0.1**
Regent Honeyeater	132.3	76.7	40.1	249.1	279	**-29.9**
Swift Parrot	48.7	4.7	0	53.4	54	**-0.6**
South-eastern Long-eared Bat	132.6	104.2	67.2	304.0	334	**-30.0**

* Cannot be summed to calculate a total area of clearing as clearing overlaps in some cases.

3.2 Detailed MNES review

3.2.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland

Literature and data review

In addition to literature cited in **Section 2.1**, the following resources were utilised in the literature and database review for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland:

- National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Department of Environment, Climate Change and Water NSW, Sydney (DECCW 2011)
- Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on Amendments to the List of Ecological Communities under the EPBC Act TSSC (2009)

Text is taken directly from the above sources unless noted otherwise.

Distribution, ecology and habitat

Box-Gum Grassy Woodlands and Derived Grasslands are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. The tree-cover is generally discontinuous and consists of widely-spaced trees of medium height in which the

canopies are clearly separated (Yates & Hobbs 1997). In its pre-1750 state, this ecological community was characterised by:

- a ground layer dominated by tussock grasses;
- an overstorey dominated or co-dominated by White Box, Yellow Box or Blakely's Red Gum, or Grey Box in the Nandewar bioregion; and,
- a sparse or patchy shrub layer.

Associated, and occasionally co-dominant, trees include, but are not restricted to: Grey Box (*Eucalyptus microcarpa*), Fuzzy Box (*E. conica*), Apple Box (*E. bridgesiana*), Red Box (*E. polyanthemos*), Red Stringybark (*E. macrorhyncha*), White Cypress Pine (*Callitris glaucophylla*), Black Cypress Pine (*C. endlicheri*), Long-leaved Box (*E. goniocalyx*), New England Stringybark (*E. caliginosa*), Brittle Gum (*E. mannifera*), Candlebark (*E. rubida*), Argyle Apple (*E. cinerea*), Kurrajong (*Brachychiton populneus*) and Drooping She-oak (*Allocasuarina verticillata*). This ecological community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres (NSW Scientific Committee 2002).

Grazing can also have indirect effects upon other ground layer species through soil disturbance and physical changes to the soil such as compaction, nutrient enrichment, reduced water infiltration and erosion. These changes to the soil can facilitate and maintain weed invasions and make soil conditions unsuitable for native species regeneration (Prober et al. 2002a & 2002b; Yates & Hobbs 1997). As a consequence of these pressures, there are only a small number of areas remaining that retain a highly diverse understorey dominated by native, perennial tussock grasses. These areas are extremely rare, and usually quite small in size (Prober & Thiele 1995). They have often been cleared of trees and may no longer possess an overstorey. However, these remnants can be relatively intact despite the absence of trees.

Threats

Thiele and Prober (2000) estimated that less than 0.1% of Grassy White Box Woodlands (a component of the Box – Gum Grassy Woodland and Derived Grassland ecological community) remains in a near-intact condition. Much of the original extent of the Box – Gum Grassy Woodland and Derived Grassland ecological community has been cleared for agriculture. In most of the areas that remain, grazing and pasture-improvement have effectively removed the characteristic understorey, leaving only the overstorey trees with an understorey dominated by exotic species (McIntyre et al. 2002). In these areas, grazing has also largely prevented the regeneration of the overstorey species (Sivertsen 1993). Due to the high levels of clearing that have taken place, and continued grazing, large areas of healthy, regenerating overstorey are rare.

Regional vegetation assessment

The regional habitat assessment for Box-Gum Grassy Woodland CEEC found approximately 70,539 ha of mapped potential Box-Gum Grassy Woodland CEEC is available across the Liverpool Plains subregion, with a total of 777,480 ha within the Brigalow Belt South IBRA region. When assessed against the currently proposed footprint the impacts equate to the equivalent of <0.01% of the potential regional extent, and <0.01% of the potential regional extent when compared to the maximum approved clearing (Error! Reference source not found. and **Figure 3.1**).

Table 3.3: Regional assessment for Box-Gum Grassy Woodland CEEC.*

Region	Potential regional extent (ha)	Area to be cleared (2021 extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	777,480	12.9	<0.01%	13.0	<0.01%
Liverpool Plains IBRA subregion	70,539		0.02%		0.02%

* Rounding errors apply

Disturbance limits approach conclusion

The maximum area approved to be cleared for the project is 13 ha of Box-Gum Grassy Woodland CEEC. The 2021 extension footprint for the project is estimated to impact on 12.9 ha of Box-Gum Grassy Woodland CEEC, which represents all habitat mapped but remains below the maximum disturbance limit by 0.1 ha.

Analysis into the amount of Box-Gum Grassy Woodland CEEC within the surrounding IBRA region found that the impact to Box-Gum Woodland CEEC is the equivalent of <0.01% of the total estimated potential extent of the CEEC.

Based on the above analysis the maximum disturbance limit for Box-Gum Grassy Woodland CEEC (13 ha) has been demonstrated to minimise impacts to the CEEC. The impact proposed (12.9 ha) is also considered to be the minimum practical during each sequence of mine clearance.

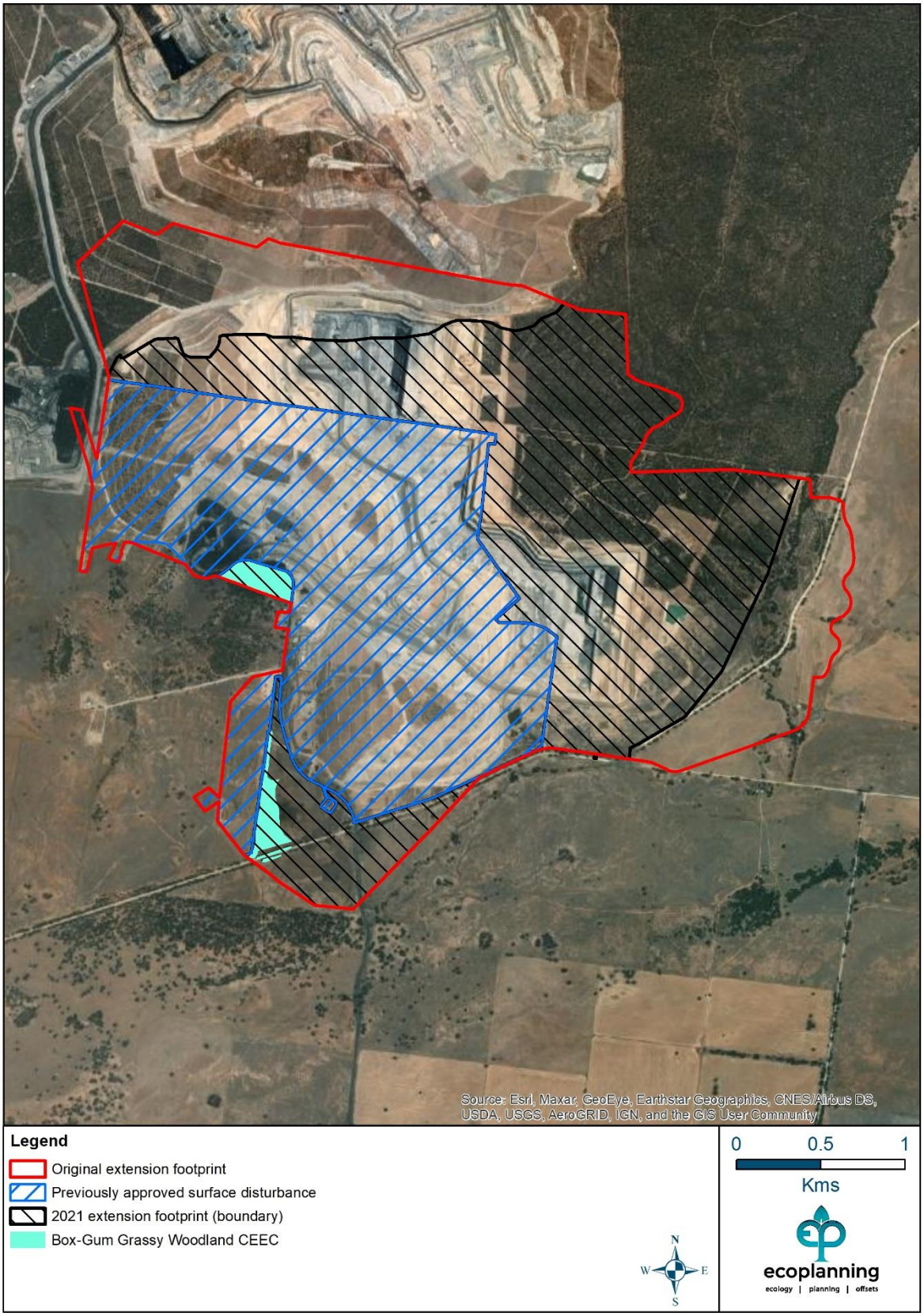

Figure 3.1: Box-Gum Grassy Woodland CEEC (RSCES 2011).

3.2.2 Regent Honeyeater

Literature and data review

In addition to literature cited in **Section 2.1**, the following resources were utilised in the literature and database review for Regent Honeyeater:

- NSW Environment, Energy and Science (EES 2021) Threatened species website. Accessed at http://www.environment.nsw.gov.au/threatenedspecies/
- EES Threatened Biodiversity Data Collection (EES 2021). Accessed at: http://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx?a=1
- Regent Honeyeater Recovery Plan 1999 – 2003. Prepared on behalf of the Regent Honeyeater Recovery Team by Peter Menkhorst, Natasha Schedvin and David Geering. Parks, Flora and Fauna Division, Victorian Department of Natural Resources and Environment (DNRE 1999).

Text below is taken directly from the above sources unless noted otherwise.

Distribution, ecology and habitat

Regent Honeyeaters occur mainly in box-ironbark open-forests and riparian stands of Casuarina on the inland slopes of the Great Dividing Range. At times significant numbers also occur in coastal forests in NSW and eastern Victoria. Particularly when breeding, Regent Honeyeaters require access to nectar or another form of sugary plant exudate such as lerps or honeydew. A few species of Eucalyptus and a mistletoe (*Amyema cambagei*) seem to be important in providing reliable and relatively predictable nectar flows. Lack of access to these dependable nectar flows at critical times, due to clearance of the most fertile stands, the poor health of many remnants, and competition for nectar from other honeyeaters, may be a major cause of the decline of this species.

The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.

Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted >20 years ago.

Colour-banding of Regent Honeyeater has shown that the species can undertake large-scale nomadic movements in the order of hundreds of kilometres. However, the exact nature of these movements is still poorly understood. It is likely that movements are dependent on spatial and temporal flowering and other resource patterns.

Threats

The following threats to the recovery of this species have been identified by EES (2021):

- Historical loss, fragmentation and degradation of habitat from clearing for agricultural and residential development, particularly fertile Yellow Box-White Box-Blakely's Red Gum woodlands.
- Continuing loss of key habitat tree species and remnant woodlands from major developments (mining and agricultural), timber gathering and residential developments.
- Key habitats continue to degrade from lack of recruitment of key forage species and loss of paddock trees and small remnants increasingly fragmenting the available habitat
- Suppression of natural regeneration of overstorey tree species and shrub species from overgrazing. Riparian gallery forests have been particularly impacted by overgrazing.
- Competition from larger aggressive honeyeaters, particularly Noisy Miners, Noisy Friarbirds and Red Wattlebirds.
- The small population size and restricted habitat availability make the species highly vulnerable to extinction via stochastic processes and loss of genetic diversity, and reduced ability to compete and increased predation and reduced fledging rates.
- Egg and nest predation by native birds and mammals
- Inappropriate forestry management practices that remove large mature resource-abundant trees. Firewood collection and harvesting in Box-Ironbark woodlands can also remove important habitat components.
- Disturbance at nesting sites leading to reduced nesting success by recreational users.
- Loss of key foraging resources as a result of inappropriate fire regimes.
- Drought has limited the availability of free-standing water, which is considered a key component of an optimal nesting site

Regional vegetation and species habitat assessment

The regional habitat assessment for Regent Honeyeater found that approximately 126,019 ha of potential habitat is available across the Liverpool Plains, and a total of 552,444 ha of potential habitat is mapped within the Brigalow Belt South IBRA region. When assessed against the currently proposed footprint the impacts equate to the equivalent of 0.05% of the regional potential habitat mapped for the Regent Honeyeater, and 0.04% of the potential habitat mapped when compared to the maximum approved clearing (**Table 3.4** and **Figure 3.2**).

Table 3.4: Regional habitat assessment for Regent Honeyeater.*

Region	Potential regional habitat (ha)	Area to be cleared (2021 extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	552,444	249.1	0.04%	279.0	0.05%
Liverpool Plains IBRA subregion	126,019		0.20%		0.22%

* Rounding errors apply

Disturbance limits approach conclusion

The maximum area of Regent Honeyeater potential habitat approved to be cleared for the project is 279 ha. The 2021 extension footprint for the project is now estimated to impact on 249.1 ha of Regent Honeyeater potential habitat, 29.9 ha less than the maximum disturbance limit.

Analysis into the amount of potential Regent Honeyeater habitat within the surrounding IBRA region found that the impact to the available potential habitat is the equivalent of 0.04% of the total potential habitat.

Based on the above analysis the maximum disturbance limit for Regent Honeyeater potential habitat (279 ha) has been demonstrated to minimise impacts to the species. The impacts proposed (249.1 ha) are also considered to be the minimum practical during each sequence of mine clearance.

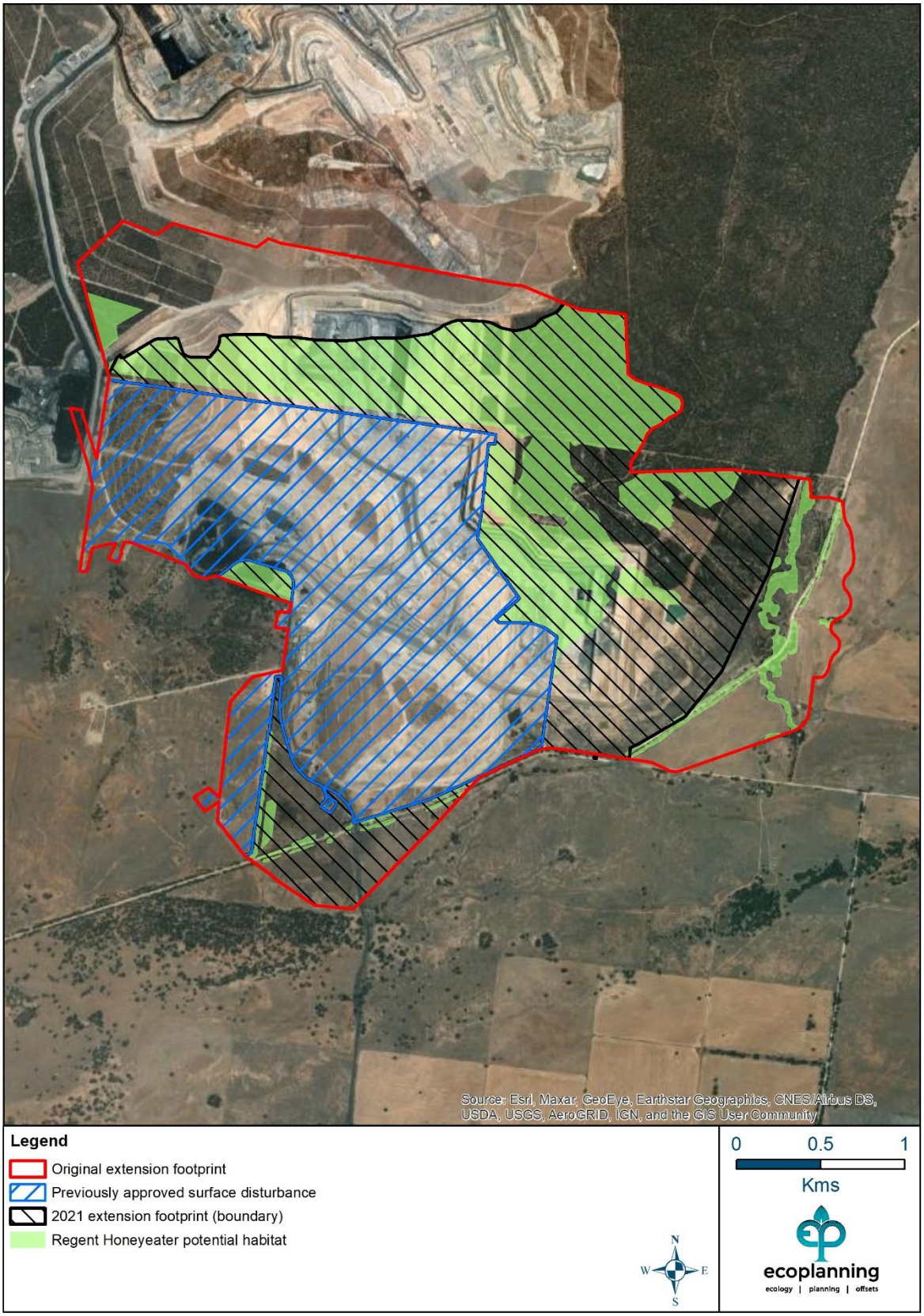

Figure 3.2: Regent Honeyeater potential habitat (RSCES 2011).

3.2.3 Swift Parrot

Literature and data review

In addition to literature cited in **Section 2.1**, the following resources were utilised in the literature and database review for Swift Parrot:

- NSW Environment, Energy and Science (EES 2021) Threatened species website. Accessed at http://www.environment.nsw.gov.au/threatenedspecies/
- EES Threatened Biodiversity Data Collection. Accessed at: http://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx?a=1
- Swift Parrot Recovery Plan. Department of Primary Industries, Water and Environment, Hobart. Swift Parrot Recovery Team (2001).

Text below is taken directly from the above sources unless noted otherwise.

Distribution, ecology and habitat

The Swift Parrot breeds only in Tasmania and migrates to mainland Australia between March and October. During winter it is semi-nomadic, foraging for lerps and nectar in flowering eucalypts predominantly in Victoria and New South Wales, particularly in box ironbark forests and woodlands. In Tasmania, the breeding range of the Swift Parrot is largely restricted to the east coast within the range of the Tasmanian blue gum.

In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*C. gummifera*), Mugga Ironbark (*E. sideroxylon*), and White Box (*E. albens*). Commonly used lerp infested trees include Inland Grey Box (*E. microcarpa*), Grey Box (*E. moluccana*) and Blackbutt (*E. pilularis*). They return to some foraging sites on a cyclic basis depending on food availability.

Following winter, they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum (*Eucalyptus globulus*). The breeding season of the Swift Parrot coincides with the flowering of blue gum and the nectar of this eucalypt is the main source of food for the parrots during breeding.

Threats

Woodlands and forests within the parrot's over-wintering range and its restricted breeding distribution have been fragmented and substantially reduced by land clearance for agriculture and urban and coastal development. Forestry operations and firewood collection have also altered the age structure of forests, resulting in the loss of older trees that provide a major food resource as well as hollows for nesting. The swift parrot also suffers from high mortality during the breeding season through collisions with man-made structures such as windows, wire mesh fences and vehicles.

The following threats to the recovery of this species have been identified by EES (2021):

- Habitat loss and degradation.
- Changes in spatial and temporal distribution of habitat due to climate change.
- Reduction in food resources due to drought.
- Competition for food resources.
- Collision mortality.
- Psittacine Beak and Feather Disease (PBFD).
- Infestation by invasive weeds.
- Inappropriate fire regimes.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.
- Predation by cats.
- Illegal capture and trade of wild birds for aviculture.

Regional vegetation and species habitat assessment

The regional habitat assessment for Swift Parrot found approximately 146,204 ha of potential habitat is available across the Liverpool Plains, and a total of 1,655,017 ha of potential habitat is mapped within the Brigalow Belt South IBRA region. When assessed against the currently proposed footprint the impacts equate to the equivalent of <0.01% of the regional potential habitat mapped for the Swift Parrot, and <0.01% of the potential habitat mapped when compared to the maximum approved clearing (**Table 3.5** and **Figure 3.3**).

Table 3.5: Regional habitat assessment for Swift Parrot.*

Region	Potential regional habitat (ha)	Area to be cleared (2021 extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	1,655,017	53.4	<0.01%	54.0	<0.01%
Liverpool Plains IBRA subregion	146,204		0.04%		0.04%

* Rounding errors apply

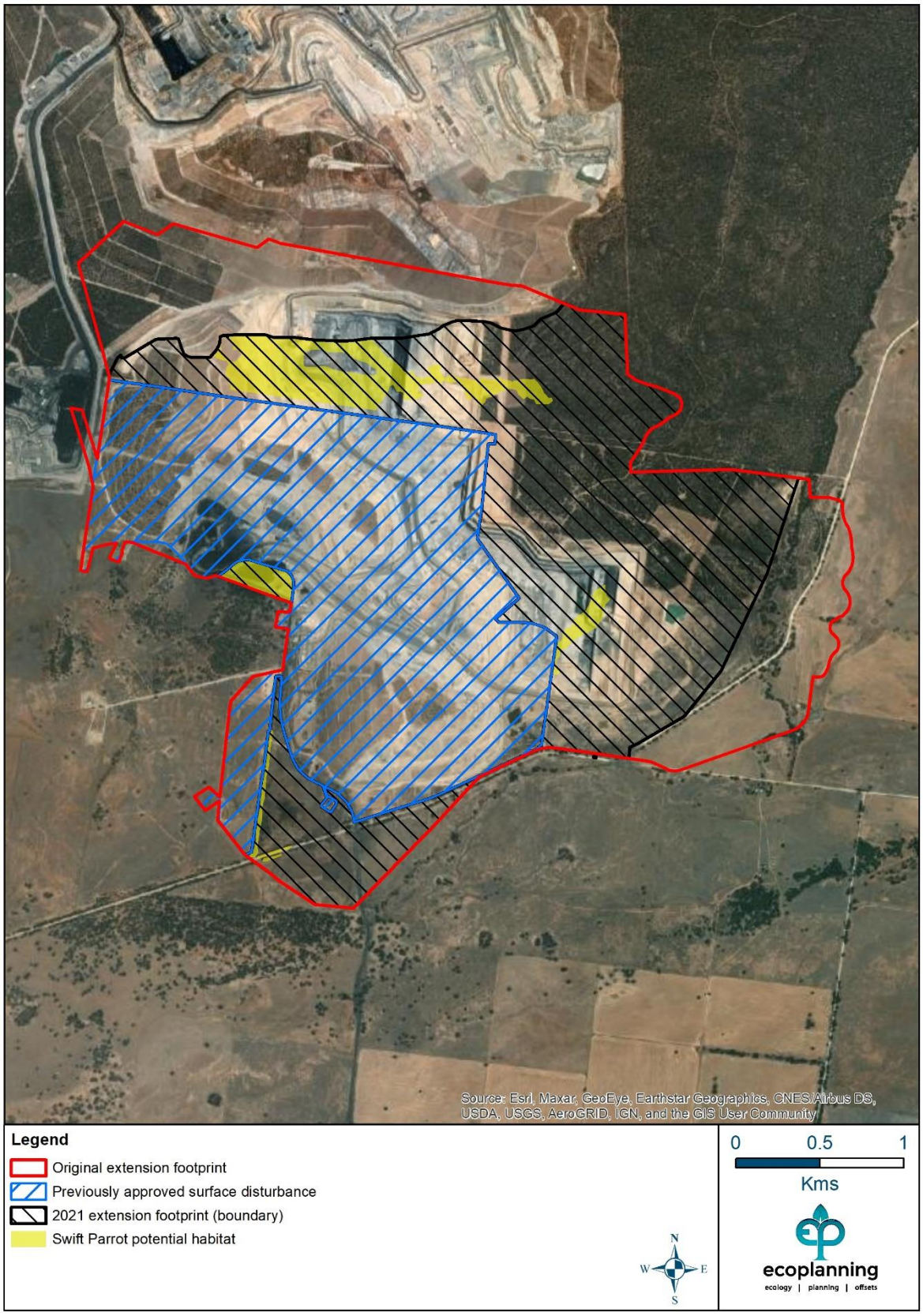

Figure 3.3: Swift Parrot potential habitat (RSCES 2011).

Disturbance limits approach conclusion

The maximum area of Swift Parrot potential habitat approved to be cleared for the project is 54 ha. The 2021 extension footprint for the project is now estimated to impact on 53.4 ha of Swift Parrot potential habitat, which represents all habitat mapped but remains below the maximum disturbance limit by 0.6 ha.

Analysis into the amount of Swift Parrot potential habitat within the surrounding IBRA region found that the impact to the available potential habitat is the equivalent of <0.01% of the total potential habitat.

Based on the above analysis the maximum disturbance limit for Swift Parrot potential habitat (54 ha) has been demonstrated to minimise impacts to the species. The impacts proposed (53.4 ha) are also considered to be the minimum practical during each sequence of mine clearance.

3.2.4 South-eastern (Greater) Long-eared Bat

Until recently the south-eastern long-eared bat was included as a distinct form of the Greater Long-eared bat (*Nyctophilus timoriensis*) complex and was listed as such under the EPBC Act. In 2009 it was formally described as a separate species, *Nyctophilus corbeni* (Corben's or South-eastern Long-eared Bat), by Parnaby (2009). There are no recognised subspecies (Woinarski et al. 2014). The approvals for Tarrawonga mine refer to Greater Long-eared Bat (*N. corbeni*), and this document uses the current nomenclature and refers to the south eastern form of the Greater Long-eared Bat, *N. corbeni*, or South-eastern Long-eared Bat.

Literature and data review

In addition to literature cited in Section 2.1, the following resources were utilised in the literature and database review for South-eastern Long-eared Bat:

- NSW Environment, Energy and Science (EES 2021) Threatened species website. Accessed at https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10568
- EES Threatened Biodiversity Data Collection. Accessed at: http://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx?a=1
- *Nyctophilus corbeni* (south-eastern long-eared bat) conservation advice, approved on 01/10/2015 by the Commonwealth TSSC. Accessed at: https://www.environment.gov.au/biodiversity/threatened/species/pubs/83395-conservation_advice-01102015.pdf

Text below is taken directly from the above sources unless noted otherwise.

Distribution, ecology and habitat

The South-eastern Long-eared bat is found in southern central Queensland, central western New South Wales, north-western Victoria and eastern South Australia, where it is patchily distributed, with most of its range in the Murray Darling Basin (Duncan et al., 1999; Turbill and Ellis 2006), with the Pilliga Scrub region being the distinct stronghold for the species (DPIE 2021). Most records are from inland of the Great Dividing Range (Parnaby 2009). The species is uncommon within this distribution and is rarely recorded (DoE 2013), except in some areas

including the Nandewar and BBS bioregions in NSW and QLD. The species occurs in a number of national parks (NP) and nature reserves (NR) across its range.

The South-eastern Long-eared Bat is found in a wide range of inland woodland vegetation types. These include Box / Ironbark / Cypress Pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, Smooth-barked Apple woodland, River Red Gum forest, Black Box woodland, and various types of tree mallee (Duncan et al., 1999; Schulz and Lumsden 2010; Woinarski et al., 2014). The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches (Turbill and Ellis 2006), suggesting its home range is probably large (Lumsden et al., 2008). It appears that old-growth vegetation is a critical habitat component in the Victorian distribution (Lumsden et al., 2008). The species has also been found to be much more abundant in habitats that have a distinct tree canopy and a dense, cluttered understorey layer (Turbill and Ellis 2006).

The South-eastern Long-eared Bat is an insectivorous bat that hunts by taking flying prey or by foliage-gleaning in flight or by foraging on the ground (Lumsden and Bennett 2000; Schulz and Lumsden 2010). When hunting in flight it generally consumes beetles, bugs and moths (Lumsden and Bennett 2000), however it has also been recorded feeding on grasshoppers and crickets (Department of the Environment 2013). Foraging appears to be concentrated around patches of trees in the landscape, with many individuals from different species of bat sharing the same foraging area (Department of the Environment 2013).

Studies have found that the south-eastern long-eared bat roosts solitarily, mainly in dead trees or dead spouts of live trees. In studies of roosting behaviour in Victoria most bats were found roosting individually in mallee eucalypts in areas of long-unburnt mallee, with some under bark or in fissures of dead Buloke (*Allocasuarina luehmannii*) or Belah (*Casuarina cristata*) trees (Lumsden et al., 2008). A study in New South Wales found maternity colonies, consisting of 10-20 individuals, roosting in dead trees including Ironbarks, Cypress and Buloke (Schulz and Lumsden 2010). It appears that most roost sites are used just for a single day and large distances are travelled at night, with consecutive roost sites generally within four km (Lumsden et al., 2008).

Threats

Due to the lack of data available to assess the population decline of the South-eastern Long-eared Bat, providing a detailed assessment of the current threats to the survival of this species is difficult. However it is likely that area of occupancy is declining due to habitat loss, particularly in NSW and QLD, and to habitat degradation associated with altered fire regimes, timber extraction, mining and other factors (Woinarski et al., 2014). Habitat loss and fragmentation are considered here as known threats, with potential threats discussed following these known threats.

Regional vegetation and species habitat assessment

The regional habitat assessment for South-eastern Long-eared Bat found that approximately 172,005 ha of potential habitat is available across the Liverpool Plains, and a total of 1,912,021 ha of potential habitat is mapped within the Brigalow Belt South IBRA region. When assessed against the 2021 extension footprint the impacts equate to the equivalent of 0.02% of the regional potential habitat mapped for the South-eastern Long-eared Bat, and 0.02% of the potential habitat mapped when compared to the maximum approved clearing (**Table 3.6** and **Figure 3.4**).

Table 3.6: Regional habitat assessment for South-eastern Long-eared Bat.*

Region	Potential regional habitat (ha)	Area to be cleared (2021 extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	1,912,021	304.0	0.02%	334.0	0.02%
Liverpool Plains IBRA subregion	172,005		0.18%		0.19%

* Rounding errors apply

Disturbance limits approach conclusion

The maximum area of South-eastern Long-eared Bat potential habitat approved to be cleared for the project is 334 ha. The 2021 extension footprint for the project is estimated to impact on 304.0 ha of South-eastern Long-eared Bat potential habitat, 30 ha less than the maximum disturbance limit.

Analysis into the amount of South-eastern Long-eared Bat potential habitat within the surrounding IBRA region found that the impact to the available potential habitat is the equivalent of 0.02% of the total potential habitat.

Based on the above analysis the maximum disturbance limit for South-eastern Long-eared Bat potential habitat (334 ha) has been demonstrated to minimise impacts to the species. The impacts proposed (304 ha) are also considered to be the minimum practical during each sequence of mine clearance.

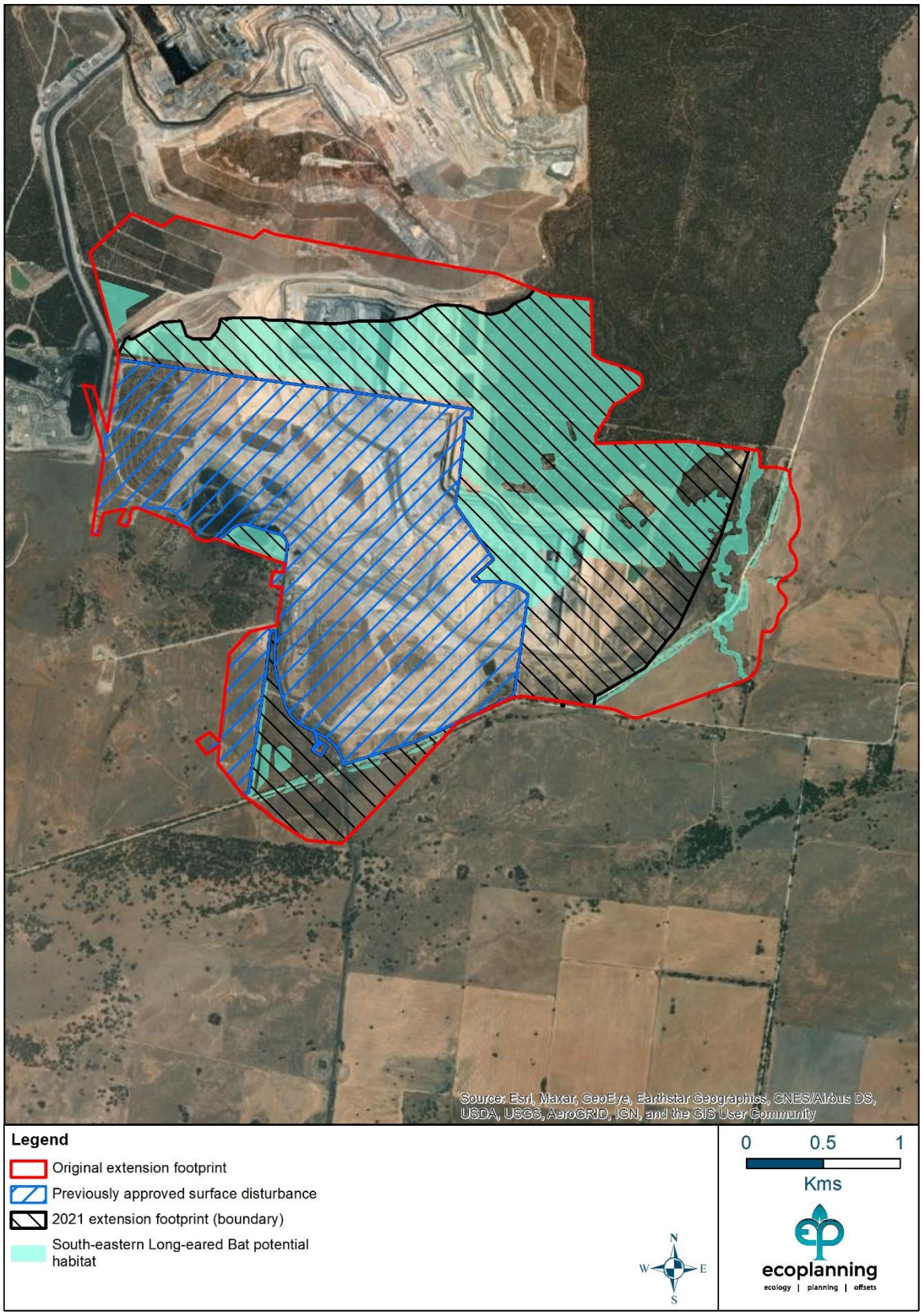

Figure 3.4: South-eastern Long-eared Bat potential habitat (RSCES 2011).

3.2.5 Tylophora linearis

In March 2016, during pre-clearance surveys within the Tarrawonga Mine project area, *Tylophora linearis* was recorded at 33 locations (ELA 2016; Hunter Eco 2016) (**Figure 3.5**). The species had not previously been detected within the project footprint. *Tylophora linearis* is listed as endangered under the EPBC act and is therefore considered a MNES.

The species was first described by Forster (1992) and was initially known from only four records (Hunter Eco 2016). Records within the NSW BioNet Atlas have steadily grown over time, with the NSW BioNet Atlas containing 602 records in 2015 (Hunter Eco 2016) and, in 2019, containing 899 records.

Although not all records include the number of individuals present at each location, the 602 records described in Hunter Eco 2016 contain 2,337 individuals. The species is known to die back to only underground rhizomes then resprout following sufficient rainfall (Hunter Eco 2016), making the species particularly difficult to identify during extended periods of low rainfall.

Consent condition 30 (EPBC 2011/5923) requires that the Commonwealth Government be notified should additional matters of MNES be recorded within the Project area. On identification of the species within the Project footprint TCPL notified the Commonwealth Government and an EPBC Act Assessment was completed by Hunter Eco (2016). The assessment found the following (Hunter Eco 2016):

- Targeted surveys by Niche Environment and Heritage within Leard State Forest, Leard Conservation Area and properties identified as offsets for the Maules Creek coal mine in April and May 2014 identified 29,484 plants in 128 hectares (ha) of survey transects
- Based on the results from Niche Environment and Heritage, a *Tylophora linearis* modelled population of 1.04 million plants within the region is estimated
- It is conservatively anticipated that, due to the wide availability of suitable habitat within the Tarrawonga Project area, up to 127.5 ha of *Tylophora linearis* habitat will be cleared within the Tarrawonga Project area to 2020. This would result in an estimated loss of approximately 11,000 plants to the year 2020. This represents approximately 1% of the estimated total *Tylophora linearis* plants in the immediate region
- The impact to *Tylophora linearis* from the Tarrawonga Mine will not have a significant impact on *Tylophora linearis*.

The assessment by Hunter Eco (2016) found that a significant impact to *Tylophora linearis* will not occur. As such no offset is being considered for *Tylophora linearis* and a maximum disturbance limits assessment was not required.

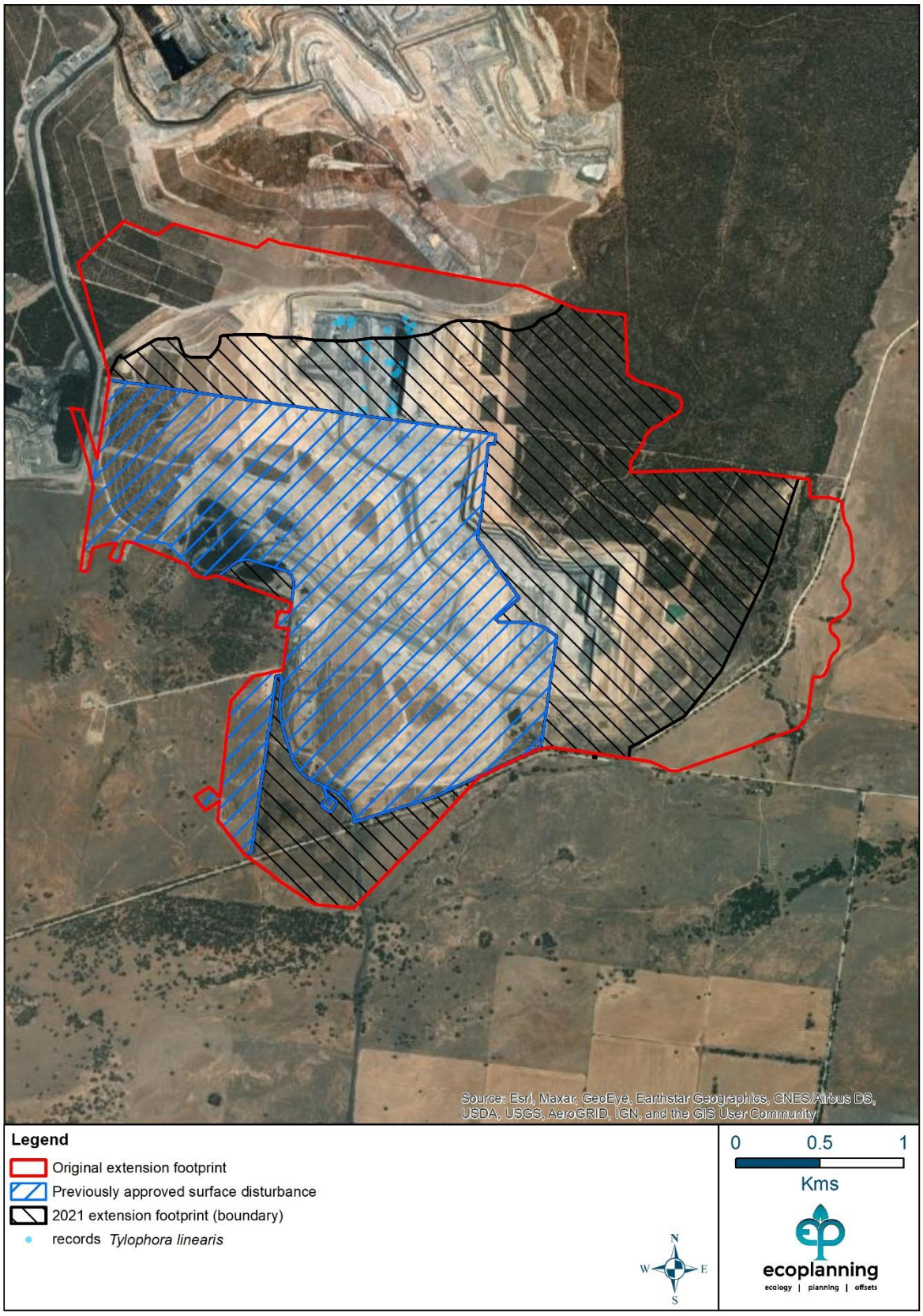

Figure 3.5: ***Tylophora linearis*** **records.**

4. Conclusion

The analysis completed for this report included an assessment of the proposed impacts to a number of MNES compared to the disturbance approved. A review of the potential habitat and/or extent of each MNES within both the Liverpool Plains subregion and Brigalow Belt South region was also completed, with the area proposed to be cleared compared to these figures.

The analysis found the proposed clearing for each MNES is less than the maximum disturbance limit authorised by conditions 1 and 2 of EPBC 2011/5923. The analysis also found that the clearing proposed represents a small proportion of the potential threatened species habitat or CEEC extent in the Brigalow Belt South IBRA region and Liverpool Plains IBRA subregion.

One MNES (*Tylophora linearis*) not previously identified within the Tarrawonga Mine Project site was confirmed during pre-clearance surveys. An assessment by Hunter Eco (2016) found that a significant impact to *Tylophora linearis* will not occur, and consequently a disturbance limit was not a condition of the project approval.

Although the 2021 extension footprint provided by TCPL has slightly larger impacts than the 2020 footprint previously assessed, the 2021 footprint has continued to reduce the impacts that will occur to MNES on the Project site compared to the approved disturbance limits.

Based on the analysis completed, the progressive rehabilitation planned for the mine and the amount of MNES habitat in the surrounding region the maximum disturbance limit for each MNES has been demonstrated to minimise impacts to the potential habitat or extent of each MNES assessed.

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Appendix A: Independent ecological expert confirmation

Australian Government
Department of Agriculture, Water and the Environment

Ref: 2010/5566
2011/5923

Mr Scott Mitchell
Group Environment Superintendent
Whitehaven Coal Limited
231 Conadilly St
Gunnedah NSW 2380

Approval of independent ecological experts – Maules Creek Coal Mine (EPBC 2010/5566) and Tarrawonga Coal Mine (EPBC 2011/5923)

Dear Mr Mitchell

Thank you for your email of 16 June 2021, requesting approval of suitably qualified independent ecological experts to conduct analyses of the proposed revised disturbance limits approaches of EPBC Act approval 2010/5566-Maules Creek Coal Mine and EPBC Act approval 2011/5923-Tarrawonga Coal mine, in accordance with their specified EPBC approval conditions.

I have noted the information provided, including the qualifications and experience of the nominated ecologists and the general requirements for experts in relation to *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approvals.

As delegate of the Minister, I have approved:

- Lucas McKinnon (Ecoplanning) for conducting analyses of the proposed revised disturbance limits approaches of Maules Creek Coal Mine and Tarrawonga Coal mine, in accordance with their specified EPBC approval conditions; and
- Darren James (DAJenvironmental) for conducting analyses of the proposed revised disturbance limits approaches of Maules Creek Coal Mine and Tarrawonga Coal mine, in accordance with their specified EPBC approval conditions.

Should you require any further information please contact Robin Nielsen, Assistant Director, Post Approvals Section, on 02 6274 1004 or by email: post.approvals@awe.gov.au.

Yours sincerely

Dwaine McMaugh
Director Post Approvals
Assessments (Vic, Tas) and Post Approvals Branch

19 July 2021

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