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Disturbance Limits Approach:

Tarrawonga Coal Mine

Prepared for: Whitehaven Coal Limited

23 January 2020

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PROJECT NAME	Disturbance Limits Approach	
PROJECT ADDRESS	Tarrawonga Coal Mine	
PREPARED FOR	Whitehaven Coal Limited	
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 this 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 (*Nyctophilus corbeni*) – vulnerable

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.

To satisfy the requirements of Condition 3a and Condition 3b (**Table 1.1**), the following tasks have been undertaken:

- 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. This DLA provides an updated assessment of the proposal following from Ecoplanning (2016).

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 Greater Long-eared Bat (Nyctophilus corbeni)
within the Tarrawonga Coal Extension project area.

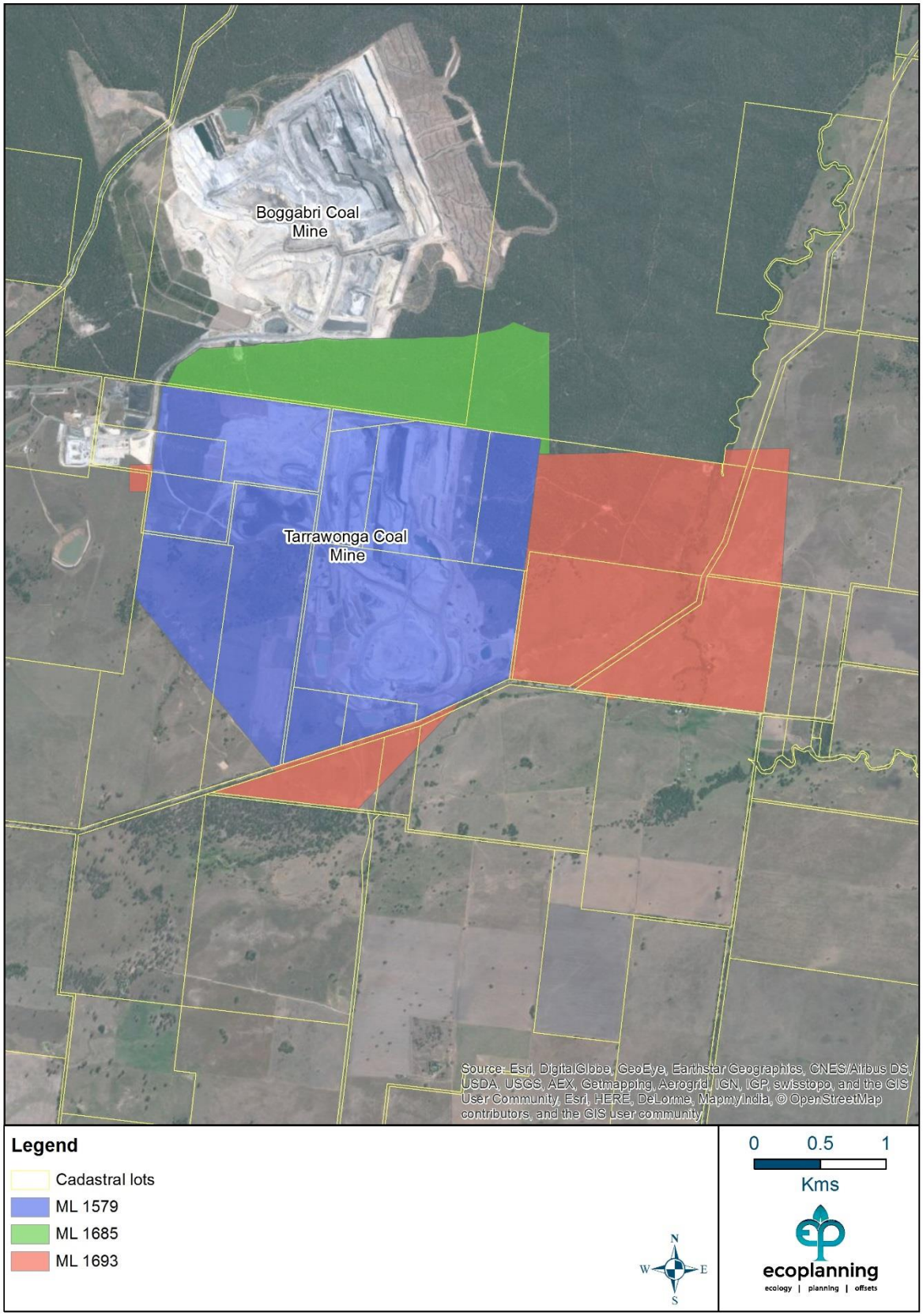

Figure 1.1: Tarrawonga Coal Mine.

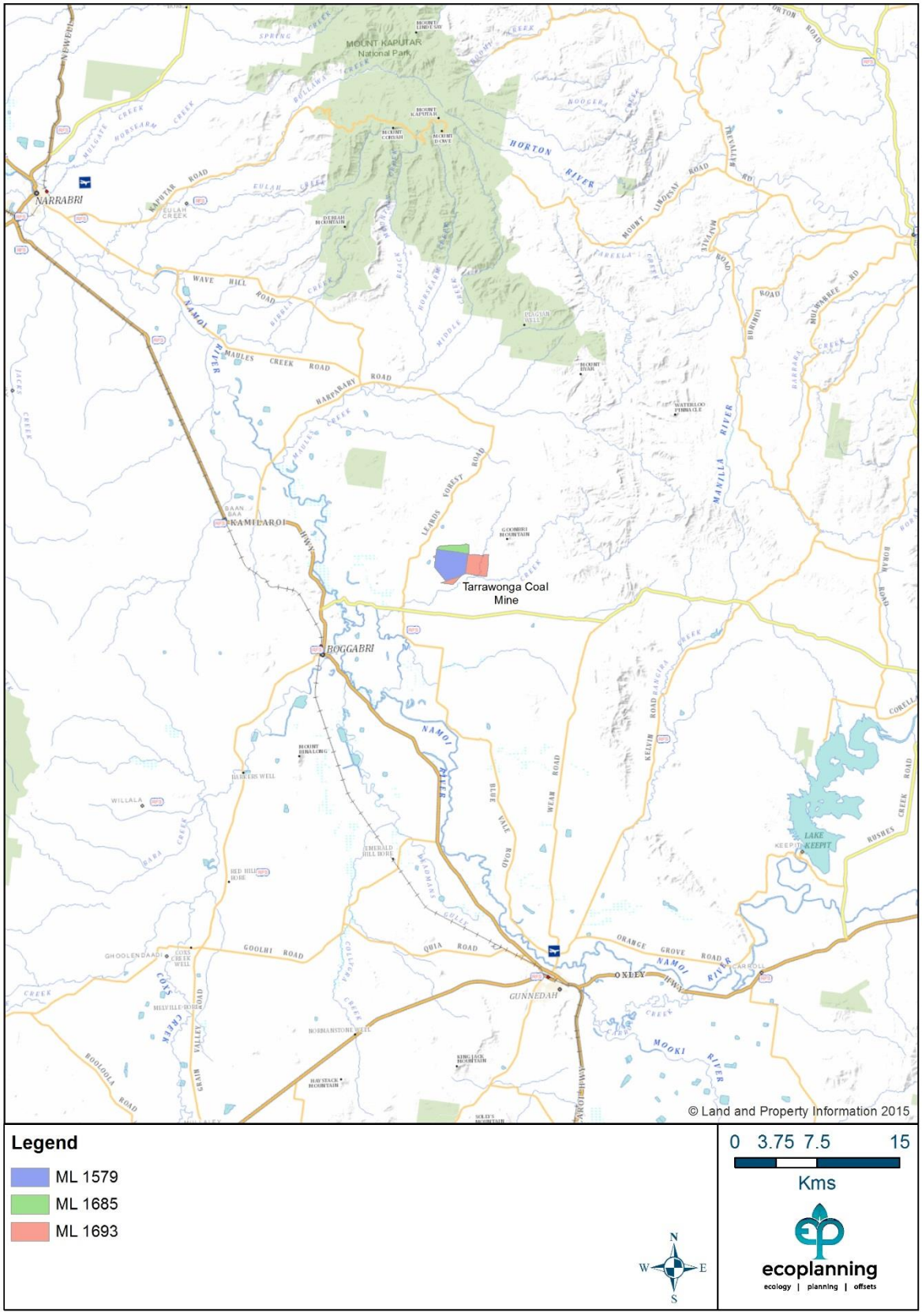

Figure 1.2: Tarrawonga Coal Mine locality.

This report reviews the maximum allowable clearing limits displayed above to determine their suitability. A new extension footprint has now also been prepared by TCPL, which has reduced the amount of vegetation and habitat to be impacted by TCPL between 2018 (year 5) and 2030 (year 17). This information has been reviewed and assessed as part of this report.

1.2.2 Rehabilitation and offsetting

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 planned use of hollows, logs and nest boxes will enhance the habitat available within the rehabilitated lands and will improve the capacity of the rehabilitated land to provide habitat for hollow and ground log dependent fauna (RSCES 2011).

Revegetation of woodland areas will utilise local species consistent with the Box-Gum Grassy Woodland critically endangered ecological community (CEEC), including a White Box overstorey and appropriate understorey (RSCES 2011). Approximately 752 ha of woodland/forest will be rehabilitated, and over the medium to long term (greater than 10 years) 730 ha of the post-mine landform is likely to be on a trajectory towards s self-sustaining ecosystem (RSCES 2011). The proposed timing of rehabilitation is provided in **Table 1.2**.

Table 1.2: Proposed timing of rehabilitation (adapted from RSCES 2011).

Year	Land clearance area (ha)[1]	Rehabilitation area (ha)*
0	441	32[2]
2	503	176
4	579	295
6	652	437
12	859	551
16	925	730
Completion	1,113	1,113[3, 4]

* Woodland/forest plus area for agricultural land use outcomes.

[1] Excludes Project disturbance that overlaps the proposed Boggabri Coal Mine surface development extent.

[2] Included in current existing/approved land clearance area of 441 ha.

[3] Includes final void area of 115 ha.

[4] Includes sediment basins/farm dams, permanent flood bund and road realignments that are retained.

Offsets are to be provided on the Willeroi offset area, located approximately 20 km north east of the Tarrawonga Coal Mine, 39 km north east of Boggabri and 57 km north of Gunnedah (RSCES 2011) (**Figure 1.3**). The site is adjacent to the Mt Kaputar National Park and appears to have been predominantly used as a grazing property in the past (RSCES 2011). The total size of the offset site 1,660 ha.

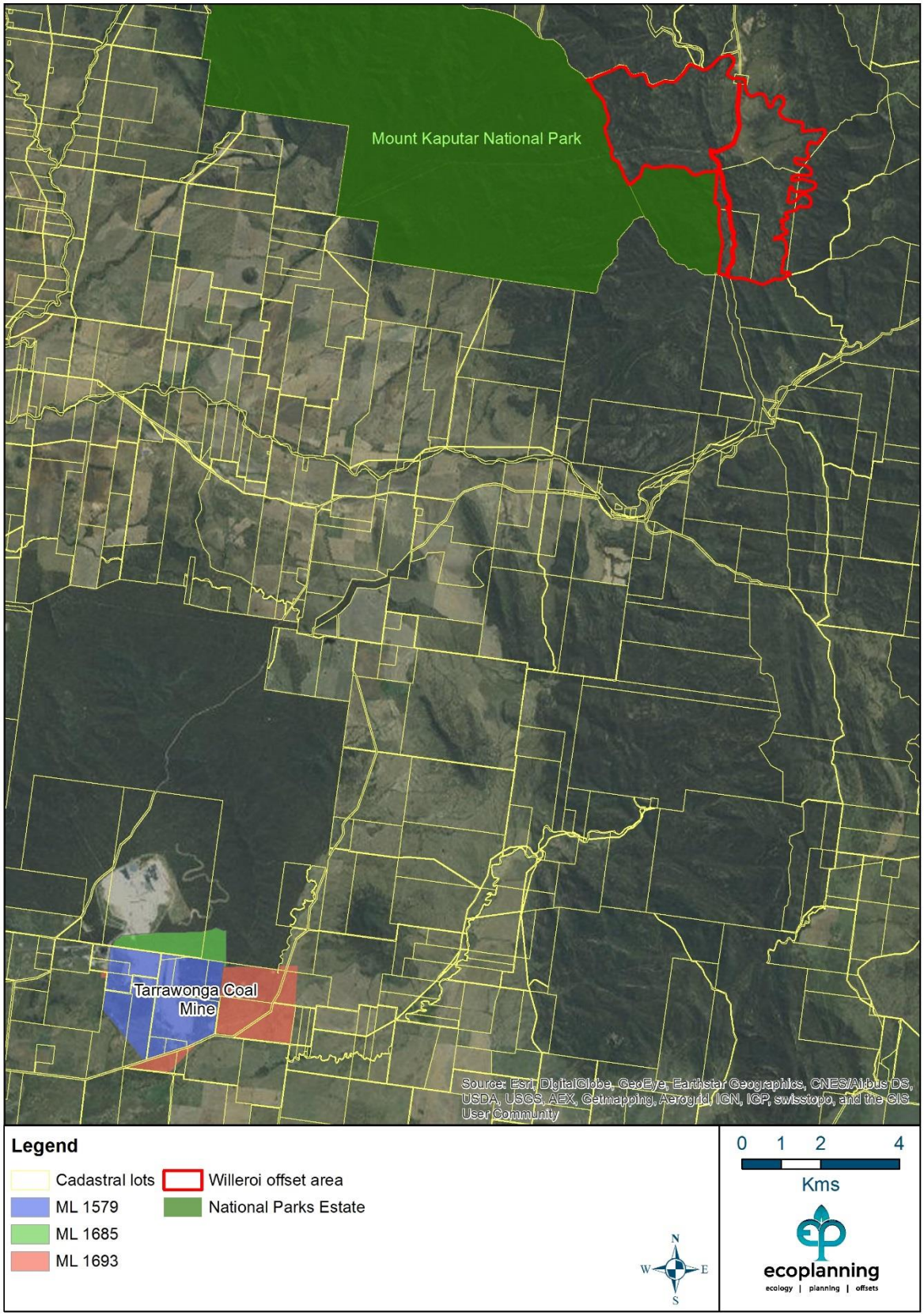

Figure 1.3: Willeroi offset area location.

2. Methods

2.1 Literature and data review

A literature and data review was initially undertaken to obtain quantitative data for the impact and offset 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 2015)
- 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 2013a)
- 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)

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 less vegetation (including CEEC and associated threatened species habitat) now to be removed. A '*new 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 new extension footprint has been analysed against the habitat and vegetation mapping within the extension footprint to provide disturbance amounts for the Project for each MNES. The areas disturbed using the new 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. 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 new 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 new extension footprint provided by TCPL, and the area of vegetation or habitat within the new 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 new extension footprint. Note, the associations used are identical to those use for the environmental assessment prepared for the project (FloraSearch 2011a and 2011b).

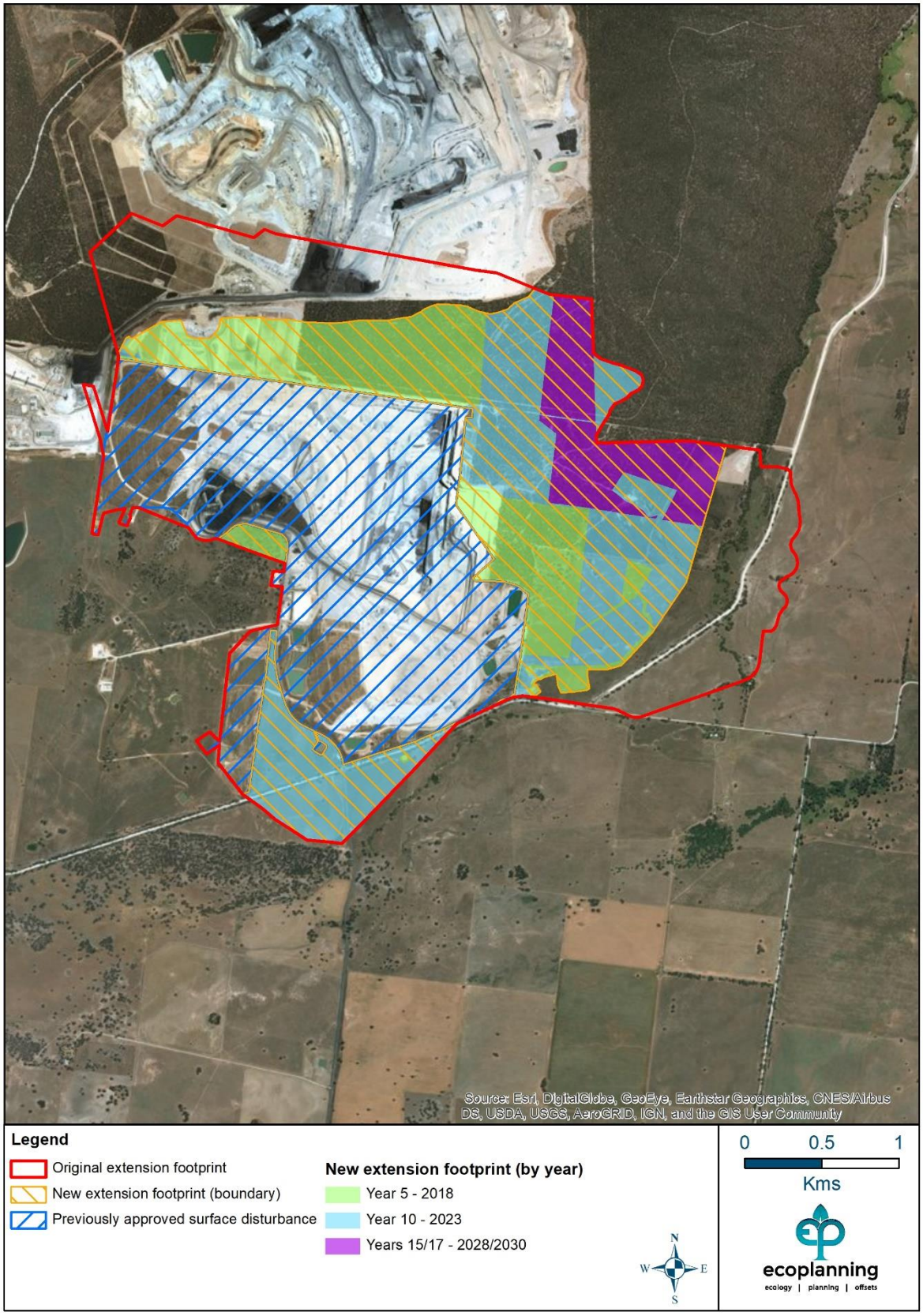

Figure 2.1: Original extension footprint and new extension footprint.

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

Vegetation code	Vegetation type and condition class	Swift Parrot	Regent Honeyeater	Greater 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	
1c	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest - Derived Native Grassland				
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	
4c	Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland - Derived Native Grassland				
5	Bracteate Honeymyrtle low riparian forest		Y	Y	
6	Cleared land				

2.3 Regional species habitat assessment

The available habitat for Regent Honeyeater, Swift Parrot and Greater 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 the 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 (OEH 2019), 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 (OEH 2019).

The area of impacted habitat (both for the maximum area approved to be cleared (EPBC 2011/5923) and the new extension footprint) was then assessed against the amount of 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 (OEH 2019) 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 Greater Long-eared Bat

To compare the above maximum disturbance limits to what is now proposed, the new 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
- Greater 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 – 248.7 ha
- Swift Parrot – 53.4 ha
- Greater Long-eared Bat – 298.5 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 (new 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	76.3	40.1	248.7
Swift Parrot	48.7	4.7	0	53.4
Greater Long-eared Bat	132.6	101.6	64.3	298.5

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

More detailed analysis is provided in **Table 3.3**, which provides a breakdown of clearing by vegetation type and MNES and identifies the habitat types where multiple species are impacted by the same clearing event. In total 325.2 ha of native vegetation clearing will occur due to the extension of the Tarrawonga Coal Mine based on the new extension footprint.

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 (new extension footprint)				Maximum disturbance limit (ha)*	Difference between proposed area of clearing (new extension footprint) and max. disturbance limit (ha)*
	2018 (Year 5)*	2023 (Year 10)*	2028/30 (Years 15/17)*	Area of clearing (ha)*		
Box-Gum Grassy Woodland	6.2	6.7	0	12.9	13	**-0.1**
Regent Honeyeater	132.3	76.3	40.1	248.7	279	**-30.3**
Swift Parrot	48.7	4.7	0	53.4	54	**-0.6**
Greater Long-eared Bat	132.6	101.6	64.3	298.5	334	**-35.5**

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

Based on the above analysis, the progressive rehabilitation planned for the mine, appropriate offsetting and the amount of MNES habitat in the surrounding region (analysis below in **Section 3.2**) the maximum disturbance limit for each MNES considered is assessed as suitable and the minimum practical during each sequence of mine clearance.

Table 3.3: Details of MNES clearing, by year, for the proposed mine extension (new extension footprint).*

Veg code	Vegetation type and condition class	Swift Parrot	Regent Honeyeater	Greater Long-eared Bat	White Box-Gum Grassy Woodland	Impact sequence by year			
						2018 (Year 5)	2023 (Year 10)	2028/30 (Years 15/17)	Area of clearing (ha)
1	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest		Y	Y		78.8	62.1	40.1	180.9
1a	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest - White Cypress Pine regeneration			Y		0.3	25.2	24.2	49.8
1b	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest - Regeneration		Y	Y		4.8	4.3	0.0	9.1
1c	White Cypress Pine - Narrow-leaved Ironbark shrubby open forest - Derived Native Grassland					2.3	5.0	7.1	14.5
2	White Box - White Cypress Pine shrubby woodland	Y	Y	Y		37.8	2.3	0.0	40.1
2b	White Box - White Cypress Pine shrubby woodland – Semi-cleared and regenerating	Y	Y	Y		4.7	0.0	0.0	4.7
3	White Box - White Cypress Pine grassy woodland	Y	Y	Y	Y	3.0	2.4	0.0	5.4
3a	White Box - White Cypress Pine grassy woodland - White Cypress Pine regeneration	Y	Y	Y	Y	3.2	0.0	0.0	3.2
3b	White Box - White Cypress Pine grassy woodland – Semi-cleared and regenerating		Y	Y	Y	0.0	1.6	0.0	1.6
3c	White Box - White Cypress Pine grassy woodland - Derived Native Grassland				Y	0.0	2.8	0.0	2.8
4	Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland		Y	Y		0.1	3.6	0.0	3.7
4c	Pilliga Box - Poplar Box - White Cypress Pine grassy open woodland - Derived Native Grassland					0.4	9.1	0.0	9.5
5	Bracteate Honeymyrtle low riparian forest		Y	Y		0	0	0	0.0
Grand total						**135.3**	**118.5**	**71.5**	**325.2**

* Rounding errors apply

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 Regent Honeyeater:

- NSW Office of Environment and Heritage (OEH 2019) Threatened species website. Accessed at http://www.environment.nsw.gov.au/threatenedspecies/
- OEH Threatened Biodiversity Data Collection. Accessed at: http://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx?a=1
- 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. enderlicheri*), Long-leaved Box (*E. gonicalyx*), New England Stringybark (*E. calignosa*), 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.

The following threats to the recovery of this species have been identified by OEH (2016):

- Clearing, degradation and fragmentation of remnants for agricultural, forestry, infrastructure and residential development.
- Continuous heavy grazing and trampling of remnants by grazing stock, resulting in losses of plant species (simplification of the understorey and groundlayer and suppression of overstorey), erosion and other soil changes (including increased nutrient status).
- Invasion of remnants by non-native plant species, including noxious weeds, pasture species and environmental weeds, including garden escapes, olives and pines.
- Invasion of remnants by feral animals resulting in the loss or modification of habitat.
- Disturbance and clearance of remnants during road, rail and infrastructure maintenance and upgrades.
- Harvesting of firewood (either living or standing dead, including material on the ground).
- Collection of on-ground woody debris in the guise of a 'clean-up'.

Regional vegetation assessment

The regional habitat assessment for Box-Gum Grassy Woodland CEEC found approximately 52,584 ha of habitat potentially available across the Liverpool Plains and a total of 597,532 ha within the Brigalow Belt South IBRA subregions. When assessed against the currently proposed footprint this would equate to the equivalent of <0.01% of the regional habitat potentially available, and <0.01% of the maximum approved footprint (**Table 3.4** and **Figure 3.1**).

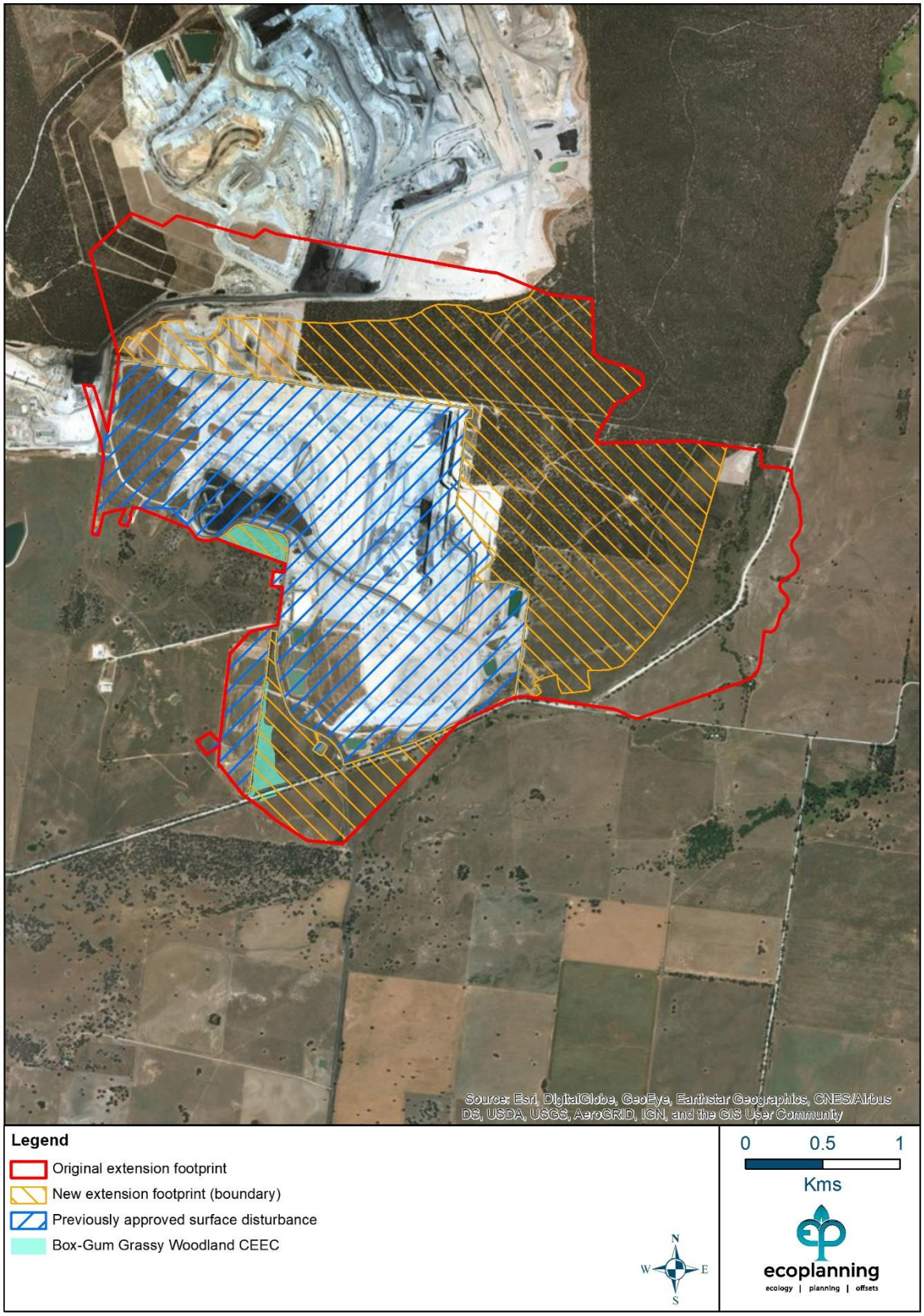

Figure 3.1: Box-Gum Grassy Woodland CEEC (RSCES 2011).

Table 3.4: Regional habitat assessment for Box-Gum Grassy Woodland CEEC.*

Region	Available habitat (ha)	Area to be cleared (new extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	597,532	12.9	<0.01%	13	<0.01%
Liverpool Plains IBRA subregion	52,584		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 new extension footprint for the project is now 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 the available habitat was the equivalent of <0.01% of the total habitat.

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

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 Office of Environment and Heritage (OEH 2019) Threatened species website. Accessed at http://www.environment.nsw.gov.au/threatenedspecies/
- OEH Threatened Biodiversity Data Collection (OEH 2019). 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.

The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important. For example the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events. Flowering of associated species such as Thin-leaved Stringybark *Eucalyptus eugenioides* and other Stringybark species, and Broad-leaved Ironbark *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from the mistletoes *Amyema miquelii, A. pendula* and *A. cambagei* are also utilised. When nectar is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings.

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. To successfully manage the recovery of this species a full understanding of the habitats used in the non-breeding season is critical.

Threats

The following threats to the recovery of this species have been identified by OEH (2016):

- 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.

Regional vegetation and species habitat assessment

The regional habitat assessment for Regent Honeyeater found approximately 127,706 ha of habitat potentially available across the Liverpool Plains and a total of 665,066 ha within the Brigalow Belt South IBRA subregions. When assessed against the currently proposed footprint this would equate to the equivalent of 0.04% of the regional habitat potentially available to the Regent Honeyeater, and 0.04% for the maximum approved clearing (**Table 3.5** and **Figure 3.2**).

Table 3.5: Regional habitat assessment for Regent Honeyeater.*

Region	Available habitat (ha)	Area to be cleared (new extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	665,066	248.7	0.04%	279	0.04%
Liverpool Plains IBRA subregion	127,706		0.19%		0.22%

* Rounding errors apply

Disturbance limits approach conclusion

The maximum area approved to be cleared for the project is 279 ha of potential Regent Honeyeater habitat. The new extension footprint for the project is now estimated to impact on 248.7 ha of Regent Honeyeater habitat, 30.3 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 habitat was the equivalent of 0.04% of the total habitat.

Based on the above analysis the maximum disturbance limit for the Regent Honeyeater (279 ha) is assessed as suitable. The impacts proposed (248.7 ha) are also considered to be the minimum practical during each sequence of mine clearance.

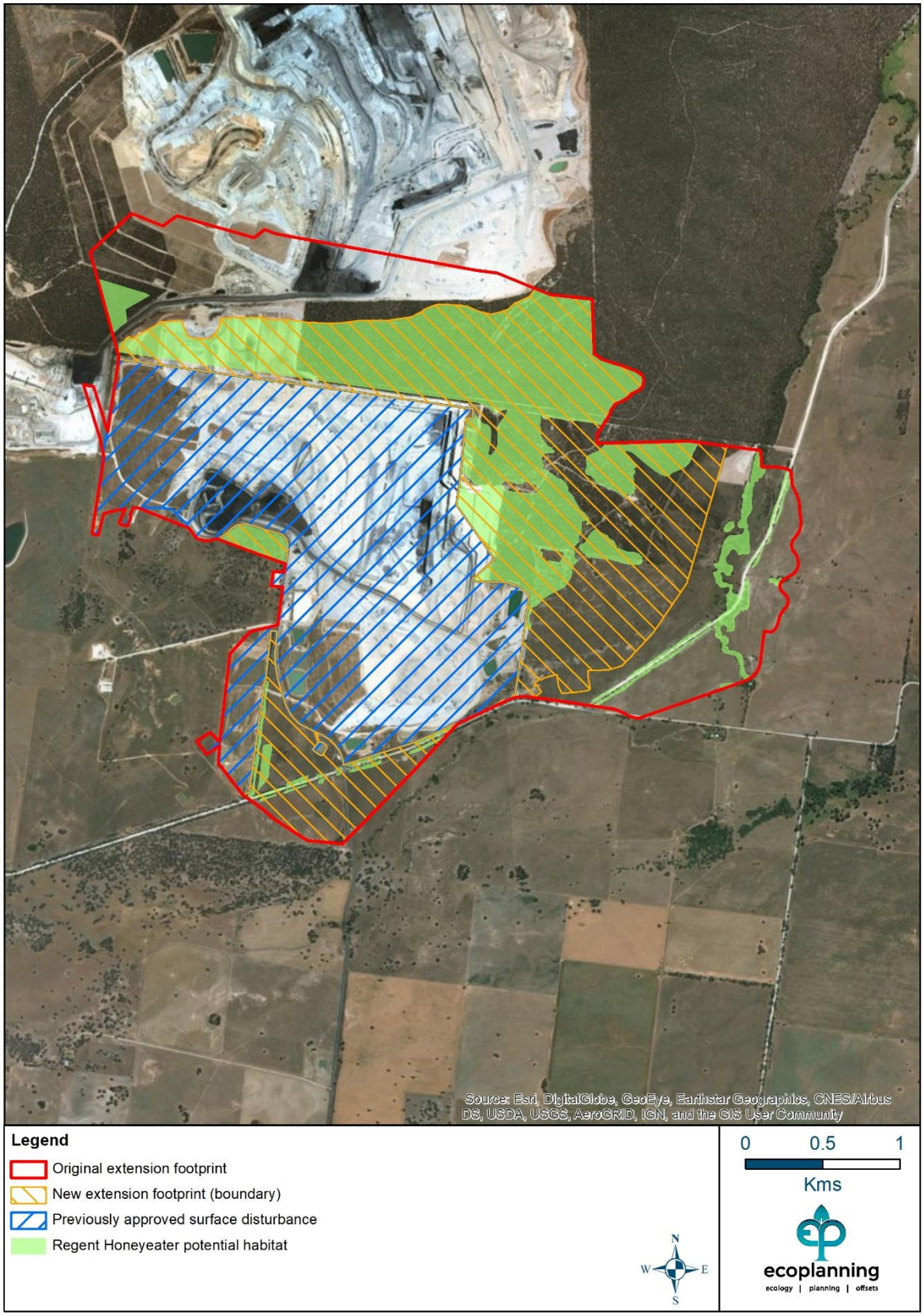

Figure 3.2: Potential Regent Honeyeater habitat (RSCES 2011).

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 Office of Environment and Heritage (OEH 2019) Threatened species website. Accessed at http://www.environment.nsw.gov.au/threatenedspecies/
- OEH 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 OEH (2016):

- 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).
- Fragmentation of woodland habitat.
- Infestation by invasive weeds.
- Inappropriate fire regimes.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.

Regional vegetation and species habitat assessment

The regional habitat assessment for Swift Parrot found approximately 146,204 ha of habitat potentially available across the Liverpool Plains and a total of 1,661,359 ha within the Brigalow Belt South IBRA subregions. When assessed against the new extension footprint this would equate to the equivalent of <0.01% of the regional habitat potentially available to the Swift Parrot, and <0.01% for the maximum approved clearing (**Table 3.6** and **Figure 3.3**).

Table 3.6: Regional habitat assessment for Swift Parrot.*

Region	Available habitat (ha)	Area to be cleared (new extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	1,661,359	53.4	<0.01%	54	<0.01%
Liverpool Plains IBRA subregion	146,204		0.04%		0.04%

* Rounding errors apply

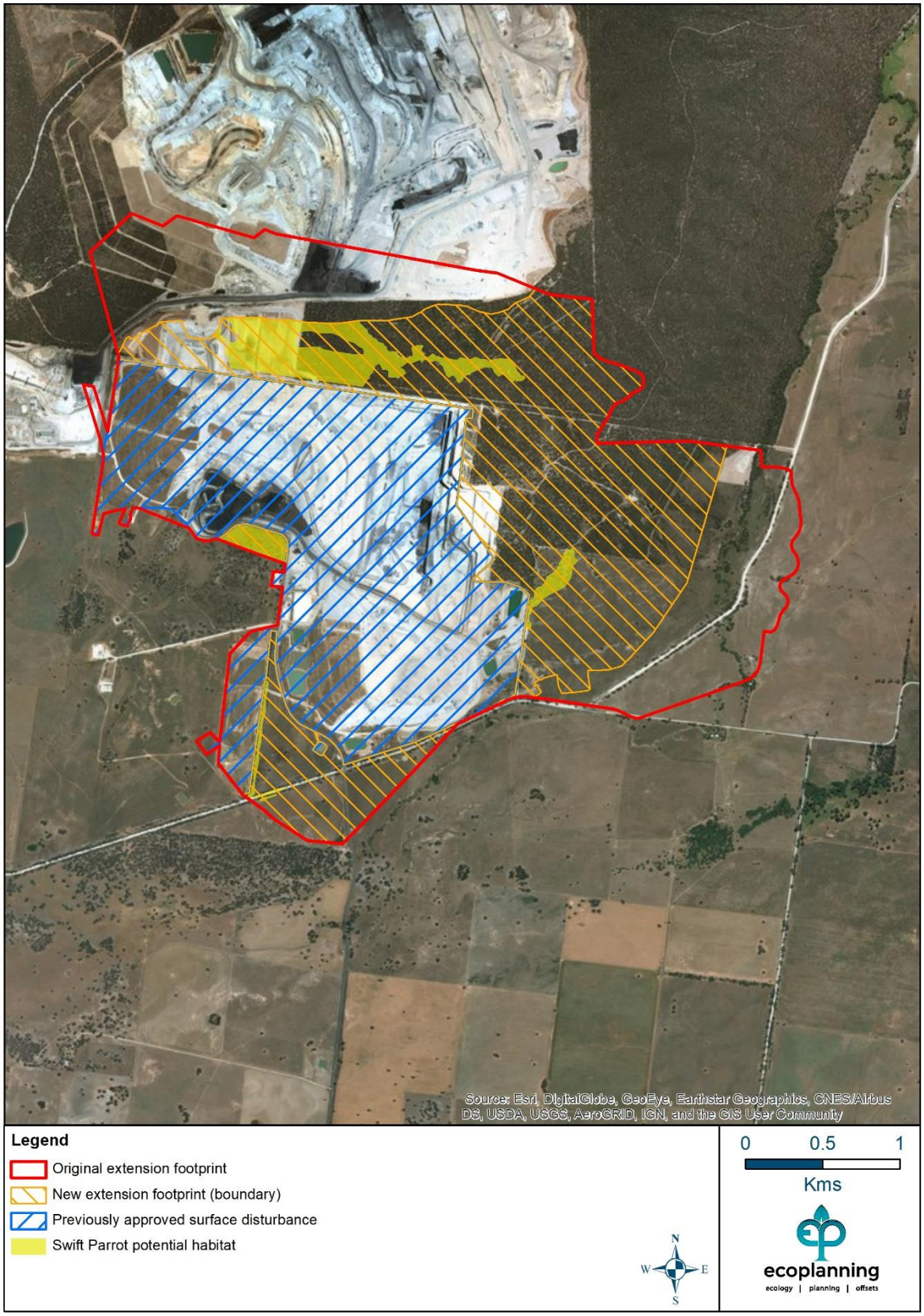

Figure 3.3: Potential Swift Parrot habitat (RSCES 2011).

Disturbance limits approach conclusion

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

Analysis into the amount of potential Swift Parrot habitat within the surrounding IBRA region found that the impact to the available habitat was the equivalent of <0.01% for both the original extension footprint and the new extension footprint.

Based on the above analysis the maximum disturbance limit for the Swift Parrot (54 ha) is assessed as suitable. The impacts proposed (53.4 ha) are also considered to be the minimum practical during each sequence of mine clearance.

3.2.4 Greater 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 Greater Broad-nosed Bat:

- NSW Office of Environment and Heritage (OEH 2019) Threatened species website. Accessed at http://www.environment.nsw.gov.au/threatenedspecies/
- OEH Threatened Biodiversity Data Collection. Accessed at: http://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx?a=1

National recovery plan for the large-eared pied bat Chalinolobus dwyeri. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra. Department of Environment and Resource Management (2011)

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

Distribution, ecology and habitat

Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. The species has been found roosting in caves, overhangs, abandoned mine tunnels and disused fairy martin nests (Hoye & Dwyer 1995; Schulz 1998). No evidence exists of the large-eared pied bat roosting in tree hollows.

Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.

Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. It is likely to hibernate through the coolest months, but it is uncertain whether mating occurs early in winter or in spring.

Threats

The lack of detailed information regarding the distribution, abundance and ecological requirements of the large-eared pied bat makes an assessment of threats difficult. The main known cause of decline in the species is the destruction of, and interference with maternity and other roosts. Information presented in this recovery plan and in Schulz et al. (1999) identifies other probable threats as: mining of roosts; mine induced subsidence of clifflines; disturbance from human recreational activities; habitat disturbance by introduced animals, including livestock; predation by introduced pests; vegetation clearing in the proximity of roosts; and fire in the proximity of roosts.

The following threats to the recovery of this species have been identified by OEH (2016):

- Clearing and isolation of forest and woodland habitats near cliffs, caves and old mine workings for agriculture or development.
- Loss of foraging habitat close to cliffs, caves and old mine workings from forestry activities and too-frequent burning, usually associated with grazing.
- Damage to roosting and maternity sites from mining operations, and recreational caving activities.
- Use of pesticides.
- Disturbance to roosting areas by goats

Regional vegetation and species habitat assessment

The regional habitat assessment for Greater Long-eared Bat found approximately 172,005 ha of habitat potentially available across the Liverpool Plains and a total of 1,912,025 ha within the Brigalow Belt South IBRA subregions. When assessed against the new extension footprint this would equate to the equivalent of 0.02% of the regional habitat potentially available to the Greater Long-eared Bat, and 0.02% for the maximum approved clearing (**Table 3.7** and **Figure 3.4**).

Table 3.7: Regional habitat assessment for Greater Long-eared Bat.*

Region	Available habitat (ha)	Area to be cleared (new extension footprint)		Maximum area approved to be cleared (EPBC 2011/5923)	
		Area (ha)	Regional impact (%)	Area (ha)	Regional impact (%)
Brigalow Belt South IBRA region	1,912,025	298.5	0.02%	334	0.02%
Liverpool Plains IBRA subregion	172,005		0.17%		0.19%

* Rounding errors apply

Disturbance limits approach conclusion

The maximum area approved to be cleared for the project is 334 ha of potential Greater Long-eared Bat habitat. The new extension footprint for the project is estimated to impact on 298.5 ha of Greater Long-eared Bat habitat, 35.5 ha less than the maximum disturbance limit.

Analysis into the amount of potential Greater Long-eared Bat habitat within the surrounding IBRA region found that the impact to the available habitat was the equivalent of 0.02% for both the original extension footprint and new extension footprint.

Based on the above analysis the maximum disturbance limit for the Greater Long-eared Bat (334 ha) is assessed as suitable. The impacts proposed (298.5 ha) are also considered to be the minimum practical during each sequence of mine clearance.

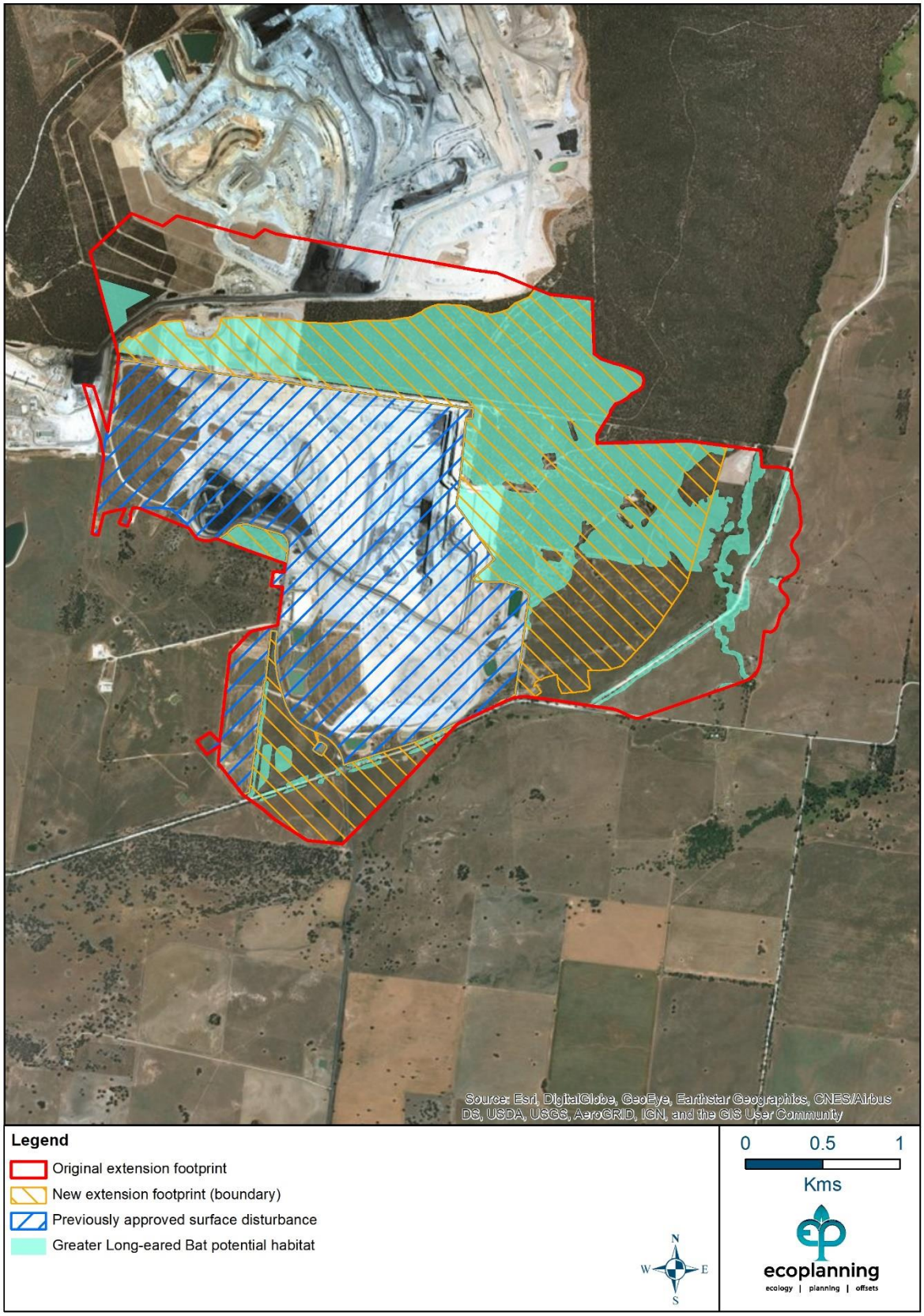

Figure 3.4: Potential Greater Long-eared Bat habitat (RSCES 2011).

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.

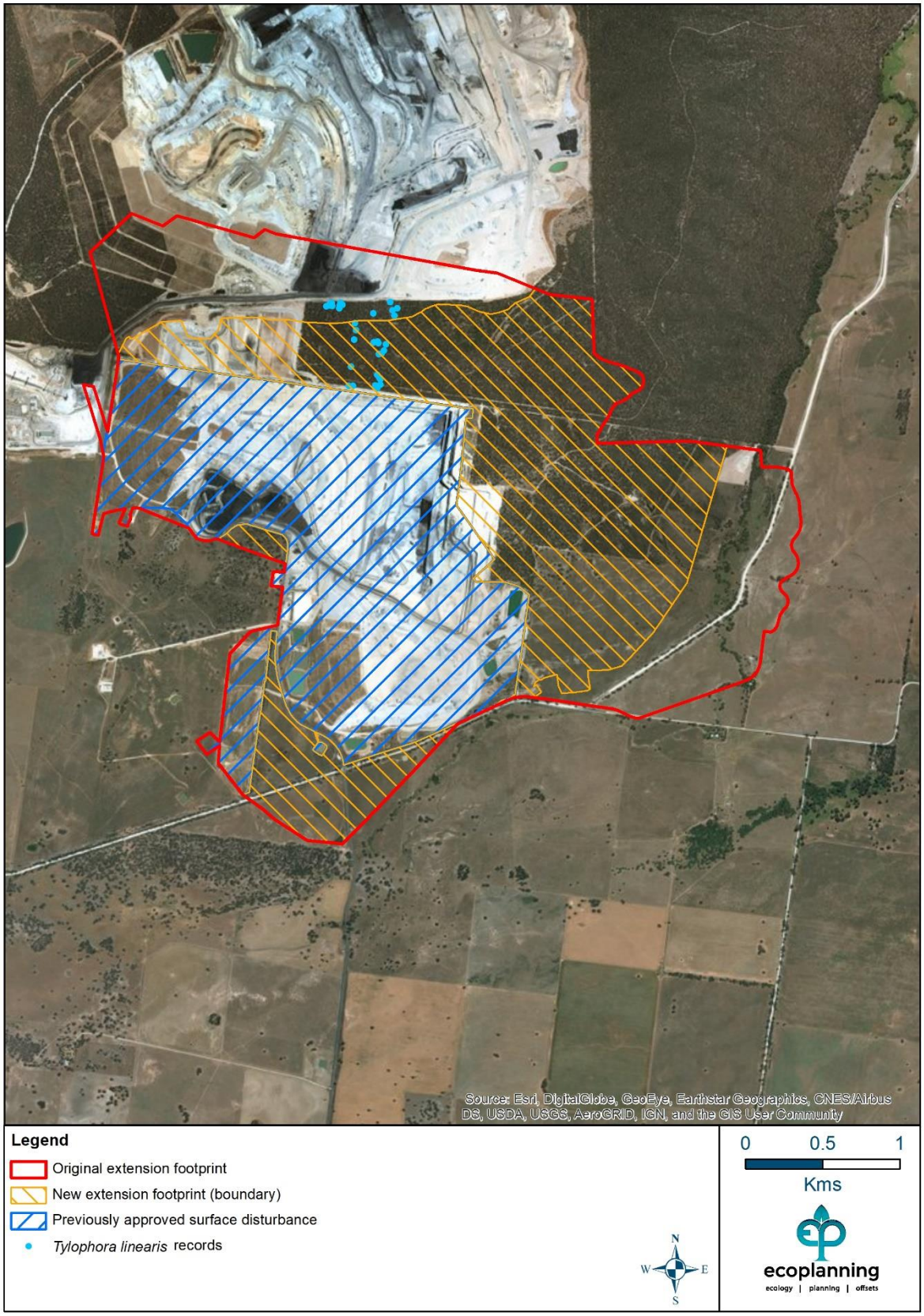

Figure 3.5: *Tylophora linearis* records.

4. Conclusion and recommendations

The analysis completed for this report included an assessment of the proposed impacts to a number of MNES compared to that approved and a review of the habitat available at both the sub-regional and regional scale compared to the area proposed to be cleared. Both assessments found that the maximum disturbance limits are consistent with the those approved for all matters of MNES.

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 maximum disturbance limits identified in EPBC 2011/5923 are considered suitable a number of measures should be implemented to reduce impacts where possible. The new extension footprint provided by TCPL for this project has reduced the impacts to occur on the Project site.

Ongoing management and protection of the offset site will provide suitable habitat for all species assessed in this report. Over time it is anticipated that the amount of habitat available on the offset site will increase based on the actions required by the Biodiversity Management Plan (BMP) (ELA 2013a).

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Appendix A: Independent ecological expert confirmation

Australian Government
Department of the Environment

Our reference: 2011/5923

Contact Officer: Cassandra Elliott
Telephone: (02) 6275 9539 Facsimile: (02) 6274 1878
Email: post.approvals@environment.gov.au

Mr Tony Dwyer
Group Superintendent – Environment
Whitehaven Coal Limited
PO Box 600
GUNNEDAH NSW 2380

Dear Mr Dwyer

Tarrawonga Coal Mine Extension, NSW (EPBC2011/5923)

Thank you for your emails of 1 April 2016 and 6 April 2016, proposing independent ecological experts along with variation to condition 3, for approval by a delegate of the Minister.

Condition 3(b) – independent ecological experts

Officers of this Department have considered your proposal that Mr Lucas McKinnon and Mr Darren James of EcoPlanning Pty Ltd be approved as ecological experts and are satisfied that these people have the independence, skills, experience and qualifications to undertake the analysis pursuant to condition 3(b).On this basis, as a delegate of the Minister for the Environment, I have decided to approve Mr McKinnon and Mr James as the independent ecological experts pursuant to this condition.

Condition 3 – variation pursuant to section 143(1)(c) of the EPBC Act

Officers of this Department have considered your proposed variation to condition 3 and are satisfied that this variation is necessary and convenient for the protection of matters of national environmental significance pursuant to section 143(1)(c) of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act). On this basis, as a delegate of the Minister for the Environment, I have decided to approve this variation pursuant to this section of the EPBC Act. This condition must now be undertaken in accordance with the varied condition specified in the variation notification, which has been attached for your information.

Conditions 34 and 38 – clarification regarding variation approved on 15 October 2015

I refer to the letter of 15 October 2015 from a delegate of the Minister for the Environment to your organisation advising of a variation to conditions 34 and 38 of the approval for the above project pursuant to section 143(1)(a) of the EPBC Act.

Condition 38 of this approval requires the approval holder to publish management plans referred to in the condition of approval on its website within one month of being approved. Additionally, condition 34 allows revised management plans to be implemented without approval if the revision will not have a 'new or increased impact' on protected matters.

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The Department has noted that condition 38 is unclear regarding when management plans that are not approved (but submitted under condition 34(a)) need to be published. I am writing to clarify that the Department requires that any revised plan submitted to the Department under condition 34(a) must be published on your website within one month of it being submitted.

If you have any questions, or require further information, please contact Cassandra Elliott on (02) 6275 9539.

Yours sincerely

S. Gaddes

Shane Gaddes
Assistant Secretary
Compliance & Enforcement Branch
Environment Standards Division

20 April 2016

Note: Under s 491 of the *Environment Protection and Biodiversity Conservation Act 1999* it is an offence to knowingly provide false and/or misleading information to a departmental officer.

2.