



## **CHAPTER 6 – LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES**

**NEW LENTON COAL PTY LTD  
NEW LENTON COAL PROJECT**

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## 6. INTRODUCTION

This chapter describes the ecological matters of national environmental significance (MNES) relevant to the Project, and assesses the potential impacts to terrestrial and aquatic ecology MNES, with mitigation measures proposed as required. This chapter assesses the significance of residual impacts to terrestrial and aquatic ecology MNES.

The information in this chapter on terrestrial ecology is based on the MNES Terrestrial Ecology Impact Assessment Report prepared by AARC Environmental Solutions (AARC) (2023) provided in **Appendix 12**. The terrestrial ecology impact assessment has been prepared in accordance with the PER Guidelines (refer to **Appendix 16**).

The PER guidelines for the Project do not specifically require an assessment of *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed aquatic species. Never-the-less this chapter presents the findings of the previous aquatic ecology surveys for the Project (**Appendix 14**), and findings from the aquatic ecology impact assessments of other projects located downstream of the Project along the Isaac River.

This chapter summarises the following management plans, provided as appendices, which will mitigate impacts to listed threatened species and ecological communities:

- MNES Species Impact Management Plan – **Appendix 23**
- Weed and Pest Management Plan – **Appendix 24**
- Receiving Environment Monitoring Program – **Appendix 25**.

### 6.1 Relevant Legislation, Policy and Guidelines

#### 6.1.1 Commonwealth

##### 6.1.1.1 Environment Protection and Biodiversity Conservation Act 1999

Any action that is likely to have a significant impact on MNES is subject to assessment under the EPBC Act by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). An EPBC Act referral was submitted to DCCEEW for the Project in September 2020, with DCCEEW providing a controlled action decision in October 2020 determining that the Project is a controlled action requiring assessment under the EPBC Act. The controlling provisions are listed threatened species and communities (s18 and 18A), and water resources (s24D & 24E).

Threatened species and threatened ecological communities (TECs) listed under the EPBC Act, that are present or that have the potential to occur in the Project area, were considered in this assessment.

##### 6.1.1.2 Environmental Offsets Policy

The Commonwealth Offsets Policy relates to the potential for significant residual impacts to MNES. The EPBC Act *Environmental Offsets Policy (2012)* discusses the role of offsets in impact assessments as well as outlining the consideration process undertaken by DCCEEW to determine the suitability of a proposed offset package. The policy defines an offset package as a “*suite of actions that a proponent undertakes in order to compensate for the residual significant impact of a project*” (DSEWPaC 2012). An offset can be in the form of a direct offset or other compensatory measure.

Suitable offset packages must include direct offsets, with at least 90% of the offset requirements met by direct offsets. Direct offsets are actions that result in a measurable conservation gain for the impacted

protected matter. The remaining less than 10% of offset requirements within an offsets package can be provided as compensatory measures. Compensatory measures are actions that will benefit the impacted protected matter without directly offsetting the impact (e.g. funding for research).

The likelihood of significant residual impacts to MNES (relevant to terrestrial and aquatic ecology) from the Project is discussed in this chapter. **Chapter 7** discusses offsets for MNES that are likely to be significantly impacted by the Project.

### 6.1.2 State

#### 6.1.2.1 Environmental Protection Act 1994

The proponent holds a current environmental authority (EA) EPML00475513 (**Appendix 4**) under the Queensland *Environmental Protection Act 1994* (EP Act) covering the New Lenton mining leases (MLs). All Project activities are conditioned by this EA. In relation to aquatic ecology, conditions C21 to C24 of the EA require a receiving environment monitoring program (REMP) to be developed, implemented, and reported on annually to the administering authority, being the Department of Environment and Science (DES). The main objective of the REMP is to report against water quality objectives (WQOs) for local waterways potentially affected by releases from the Project, and assist in assessing aquatic ecosystem health.

In relation to terrestrial ecology, Schedule H of the EA manages impacts to terrestrial ecology, including the provision of offsets. Rehabilitation of the land impacted by the Project is conditioned in Schedule G of the EA and in the approved progressive rehabilitation and closure plan (PRCP) schedule (**Appendix 5**).

#### 6.1.2.2 Vegetation Management Act 1999

The Queensland *Vegetation Management Act 1999* (VM Act) is administered by the Queensland Department of Resources (DoR). The VM Act, in conjunction with the Queensland *Planning Act 2016*, regulates the clearing of native vegetation in Queensland. The VM Act's objectives include the preservation of remnant endangered ecosystems and vegetation in areas of high nature conservation value or lands vulnerable to land degradation. Permits under either the VM Act or Planning Act for vegetation clearing are not required for the Project, as it is located within MLs, and therefore vegetation clearing for the Project is regulated by the EA.

The VM Act provides for the classification of remnant and high-value regrowth vegetation into regional ecosystems (REs) that form the basis of the assessment of vegetation communities including EPBC Act listed TECs. REs are defined by Sattler and Williams (1999) as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The Queensland Government maintains RE maps illustrating the distribution of REs throughout Queensland and these are updated periodically to reflect refinements that have been made through ground-truthing these communities.

## 6.2 Terrestrial Ecology

### 6.2.1 Terrestrial Ecology Setting

The Project is located within the Northern Bowen Basin subregion of the Brigalow Belt Bioregion in central Queensland and within the Isaac River drainage sub-basin of the Fitzroy Drainage Basin. The region experiences sub-tropical conditions with average temperatures ranges recorded in Moranbah of between 21.1°C and 34.8°C in the summer months, and 8.9°C and 25.2°C in the winter months (BoM 2020). The region receives an annual average rainfall of approximately 529.3 mm with a pronounced wet season. Approximately 75% of the annual rainfall is typically recorded between November and March, inclusive (BoM 2020).

The predominant land uses in the Project locality are cattle grazing, coal mining and coal seam gas activities. The Project will occur almost entirely on a single pastoral operation (Burton Downs), comprising two properties, Lot 9 RP903903 and Lot 1 SP159745. The proponent has entered compensation agreements with the owners of Burton Downs and other linear road infrastructure intersecting the Project's mining leases.

No World Heritage Areas or other conservation areas are located in the region.

## 6.2.2 Assessment Methodology

### 6.2.2.1 Desktop Assessments

Desktop assessments comprised a review of all relevant State and Commonwealth ecological databases, including searches of the EPBC Act protected matters search tool, as provided in **Appendix 13**, and dating from:

- April 2023 after the issue of the draft PER Guidelines
- June 2019, prior to the Referral for the Project.

Additional desktop assessments have also been conducted to collate information on the terrestrial ecological values within the survey area. A review of Queensland government mapping, database searches and available literature has been conducted to update the terrestrial ecology assessment and field survey techniques to be used to target conservation of significant flora and fauna known from the region:

- The Department of Environment and Science (DES) Vegetation map - Regional Ecosystems Biodiversity Status
- The Department of Resources (DoR, previously the Department of Natural Resources Mines and Energy, DNRME) Regulated Vegetation Map to identify areas of regulated vegetation, Vegetation Management Regional Ecosystems mapping (VM Act) and essential habitat for protected wildlife (Nature Conservation Act 1992 (NC Act)) within the survey area.
- The DES Protected Plants Flora Survey Trigger Map to identify any high-risk areas where the NC Act protected plants that are present or are likely to be present (searches based on the New Lenton MLs).

Searches of databases have also been conducted to identify known records. These searches included:

- The DES Wildlife Online search and WildNet Wildlife Records results to identify Endangered, Vulnerable, Near Threatened (EVNT) and Special Least Concern (SLC) species records.
- The Atlas of Living Australia Occurrence Records to identify EVNT and SLC species records.
- The Australian Virtual Herbarium (AVH) to identify flora EVNT species records.

### 6.2.2.2 Ecological Surveys - Summary

Terrestrial flora and fauna surveys have been conducted for the Project in:

- spring 2004 – generic baseline assessment (30 August – 7 September)
- autumn 2017 – targeted EPBC threatened species (14-22 March)
- summer 2018 – aquatic ecology survey with a component of terrestrial ecology survey (22-27 February 2018)
- autumn 2018 – across proposed road alignment corridors (30 April – 4 May 2018)
- spring 2018 – targeted Greater Glider survey (29 October – 1 November)
- autumn 2019 – targeted ecological values identified during gap analysis following changes on Project description (2-8 April)
- autumn 2023 – targeted habitat assessments for threatened EPBC species and targeted Poplar Box Grassy Woodland on Alluvial Plains TEC assessment (28th February – 9 March).

The timing of surveys corresponds with the recommended survey timing for Brigalow Belt Bioregion terrestrial vertebrate fauna in the ‘Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V3.0’ (Eyre *et al.* 2018) to account for temporal and seasonal changes in faunal assemblages. Together these surveys provide a comprehensive assessment of the terrestrial ecology values within and surrounding the Project disturbance area. The combined survey area, as well as flora and fauna survey sites are shown in Figure 6-1 and Figure 6-2, respectively.

Field surveys were undertaken in accordance with relevant State and Commonwealth survey guidelines, as listed in Section 3.2 and Appendix E of **Appendix 12**. Surveys and reporting were undertaken by suitably qualified ecologists.

Field surveys for EPBC Act listed species, considered likely to occur or having the potential to occur, have also been conducted with consideration of the requirements outlined within the ‘Species Profile and Threats Database’ (SPRAT Database).

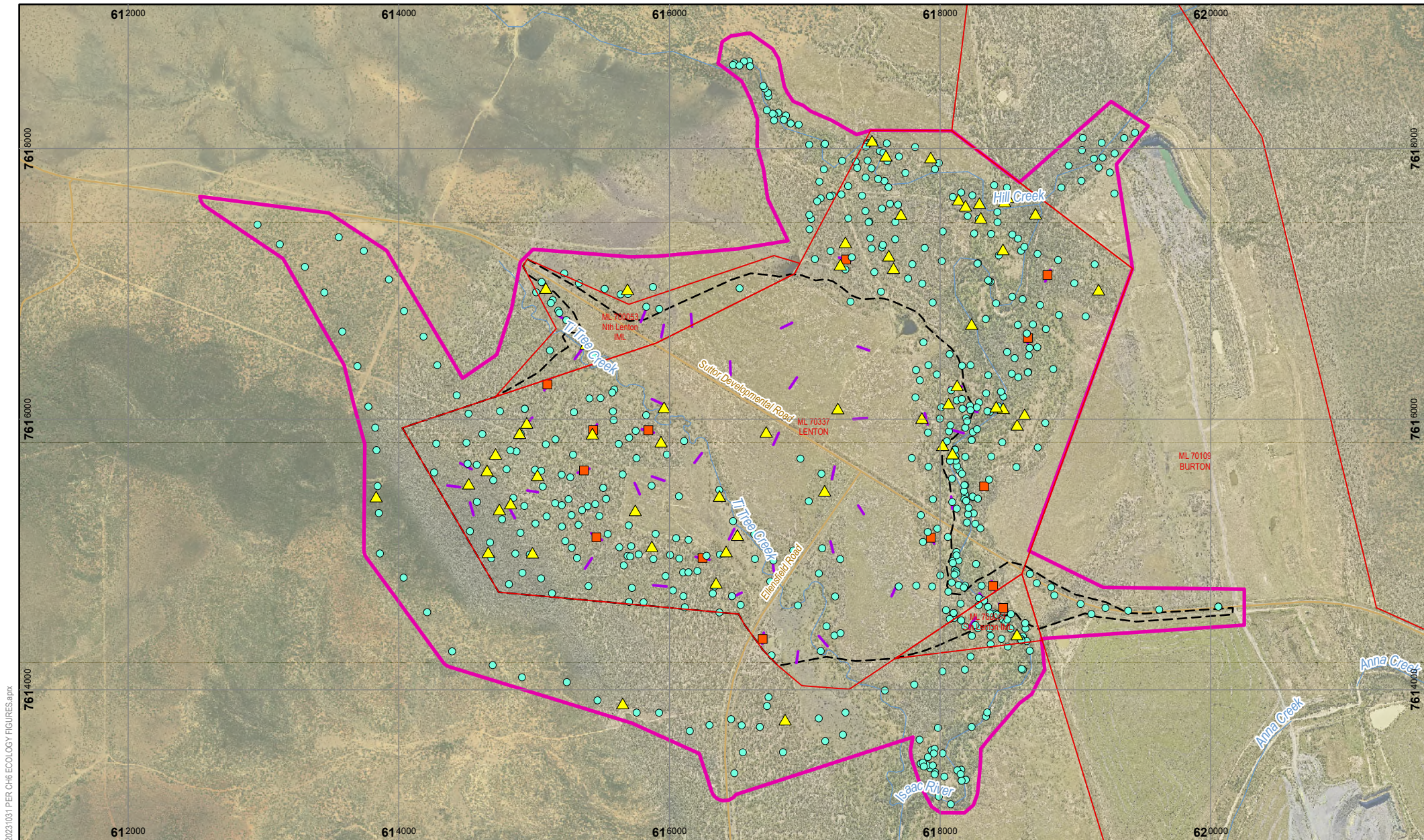
A summary of the survey methods and survey effort conducted for each listed threatened species and ecological community is provided in Table 6-1.

**Table 6-1      Survey Methods and Effort**

| MNES                                                          | Survey Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Survey Effort                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Poplar Box Grassy Woodland on Alluvial Plains TEC             | Surveys in autumn 2023.<br><br>BioCondition plots (100 x 50 m) (Eyre <i>et al.</i> 2015), as they adequately address the key diagnostic characteristics and condition thresholds for the Poplar TEC.                                                                                                                                                                                                                                                                                                                                                          | A total of 14 BioCondition plots were assessed within the confirmed patches of RE 11.3.2.                                                                                                                                                                        |
| <i>Hirundapus caudacutus</i><br><br>White-throated Needletail | Surveys in spring 2004, autumn 2017, summer 2018, autumn 2018, autumn 2019.<br><br>Twelve standard trap sites were established during the surveys, with at least two survey sites in each habitat type.<br><br>Detection methods:<br><ul style="list-style-type: none"> <li>• Diurnal searches</li> <li>• Bird surveys</li> <li>• Spotlighting</li> </ul>                                                                                                                                                                                                     | Survey effort is summarised as follows:<br><ul style="list-style-type: none"> <li>• Diurnal searches: 53 person hours</li> <li>• Bird surveys: 39 person hours</li> <li>• Spotlighting: 52 person hours</li> </ul>                                               |
| <i>Petauroides volans</i><br><br>Greater Glider               | Surveys in spring 2004, autumn 2017, summer 2018, autumn 2018, autumn 2019.<br><br>Survey in spring 2018 targeted the Greater Glider by transects along riparian vegetation on the banks of the Isaac River and Hill Creek.<br><br>Twelve standard trap sites were established during the surveys, with at least two survey sites in each habitat type.<br><br>Detection methods:<br><ul style="list-style-type: none"> <li>• Diurnal searches for species and scats</li> <li>• Camera trapping</li> <li>• Spotlight</li> <li>• Habitat assessment</li> </ul> | Survey effort is summarised as follows:<br><ul style="list-style-type: none"> <li>• Diurnal searches: 35 person hours</li> <li>• Camera trapping: 56 trap nights</li> <li>• Spotlight: 52 person hours</li> <li>• Habitat assessment: 53 survey sites</li> </ul> |

| MNES                                                             | Survey Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Survey Effort                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Phascolarctos cinereus</i></p> <p>Koala</p>                | <p>Surveys in spring 2004, autumn 2017, summer 2018, autumn 2018, autumn 2019.</p> <p>Survey in spring 2018 targeted the Greater Glider, and therefore, it targeted traces of arboreal mammals by transects along riparian vegetation on the banks of the Isaac River and Hill Creek.</p> <p>Twelve standard trap sites were established during the surveys, with at least two survey sites in each habitat type.</p> <p>Detection methods:</p> <ul style="list-style-type: none"> <li>• Diurnal searches for species and scats</li> <li>• Camera trapping</li> <li>• Spotlight</li> <li>• Call playback</li> <li>• Habitat assessment</li> </ul> | <p>Survey effort is summarised as follows:</p> <ul style="list-style-type: none"> <li>• Diurnal searches: 35 person hours</li> <li>• Camera trapping: 56 trap nights</li> <li>• Spotlight: 52 person hours</li> <li>• Call playback: 3.5 person hours</li> <li>• Habitat assessment: 53 survey sites</li> </ul> |
| <p><i>Geophaps scripta</i></p> <p>Squatter Pigeon (Southern)</p> | <p>Surveys in spring 2004, autumn 2017, summer 2018, autumn 2018, autumn 2019.</p> <p>Twelve standard trap sites were established during the surveys, with at least two survey sites in each habitat type.</p> <p>Tracks and dusty areas were surveyed during travel between sites.</p> <p>Detection methods:</p> <ul style="list-style-type: none"> <li>• Diurnal searches</li> <li>• Bird surveys</li> <li>• Camera trapping</li> <li>• Habitat assessment</li> </ul>                                                                                                                                                                           | <p>Survey effort is summarised as follows:</p> <ul style="list-style-type: none"> <li>• Diurnal searches: 53 person hours</li> <li>• Bird surveys: 39 person hours</li> <li>• Camera trapping: 56 trap nights</li> <li>• Habitat assessment: 53 survey sites</li> </ul>                                         |



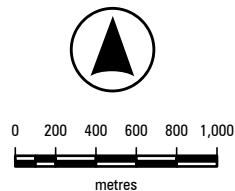


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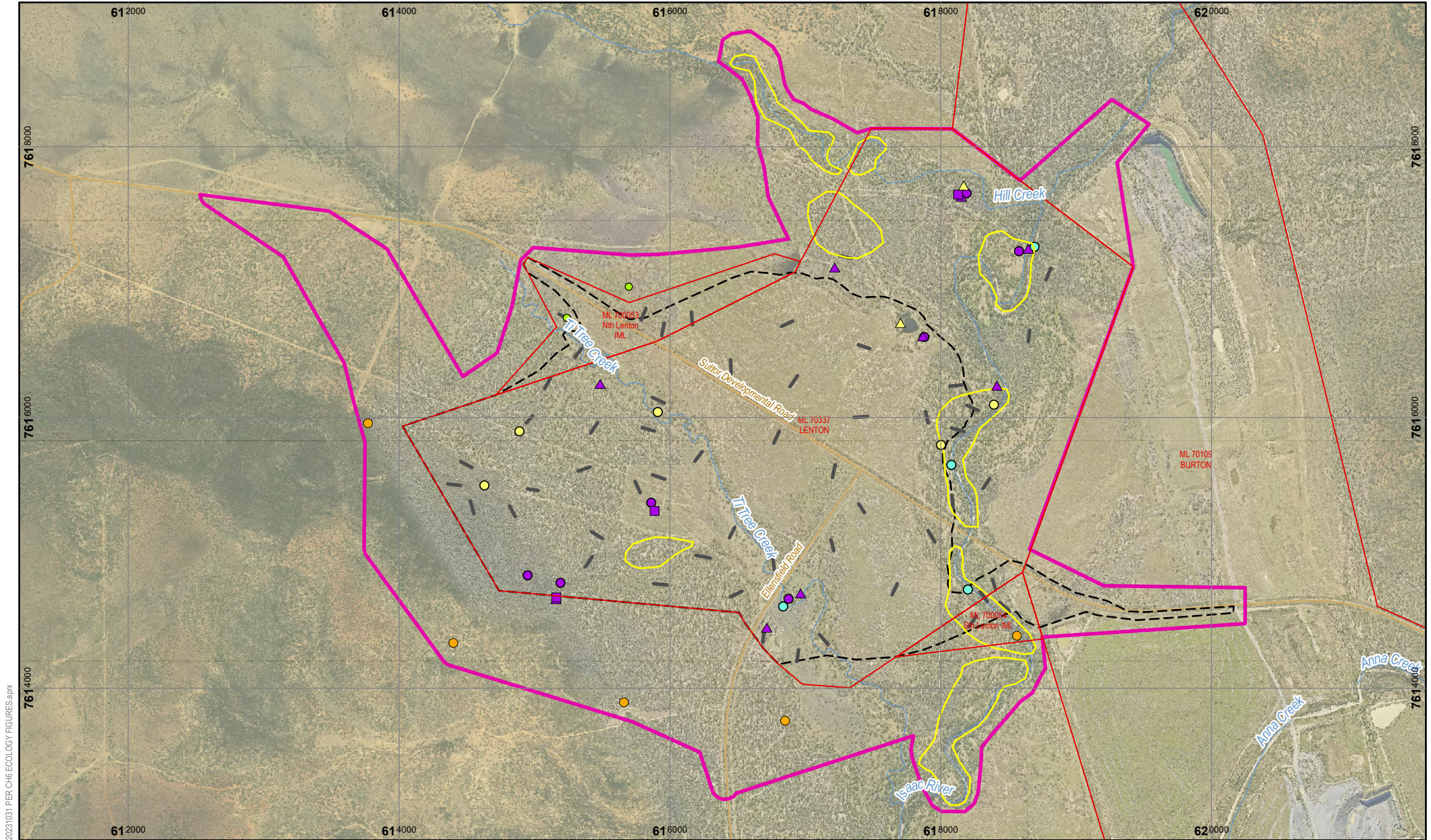
- Legend**
- Mining Lease
  - Proposed Disturbance Boundary
  - Survey Area
  - Waterway
  - Roads
  - ▲ Secondary Sites
  - Quaternary Sites
  - Poplar Box TEC Transects
  - Habitat Quality Transects

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Flora Surveys

Figure | 6-1



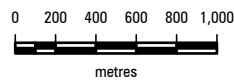


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#### Legend

- Mining Lease
- Proposed Disturbance Boundary
- Survey Area
- Waterway
- Roads

#### Fauna Survey Sites

- Fauna site
- ▲ Observation Site
- Fauna Site
- ▲ Harp Trap Site
- Mist Net Site

- Fauna Sites
- Active searches/spotlight
- Fauna Site

- Fauna Site
- Habitat Quality

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 Public Environment Report 2026



Fauna Surveys

Figure | 6-2



### 6.2.2.3 Flora Survey Methods

Flora survey methods are described in detail in Section 3.2.3 of **Appendix 12**.

Vegetation communities have been mapped and described in accordance with the ‘Methodology for surveying and mapping regional ecosystems (REs) and vegetation communities in Queensland (V6.0)’ (Neldner et al. 2022). Secondary and quaternary survey sites have been used to determine the vegetation communities and their corresponding REs within the survey area.

Additionally, during the March 2023 survey, habitat quality transects were surveyed within the proposed disturbance area. The vegetation information from these transects was also used to refine the vegetation mapping in that area and to provide important habitat condition data to support the impact assessment and any future offset calculation, if required.

All REs are classified in accordance with the Queensland Regional Ecosystem Description Database (REDD) (DES 2023). Vegetation community boundaries were validated in the field using a global positioning system (GPS) and refined using the latest aerial imagery available for the survey area. Data from the flora survey has been used in conjunction with topographical and geological maps to produce a field verified vegetation map.

When the field surveys identified vegetation communities containing vegetation that could represent a TEC, the vegetation was assessed against the key diagnostic characteristics and condition thresholds described in the relevant Commonwealth listing advice to determine whether the vegetation community meets the TEC status.

Conservation significant flora species identified by the desktop assessment were also targeted during the surveys.

### 6.2.2.4 Fauna Survey Methods

Fauna survey methods are described in detail in Section 3.2.4 of **Appendix 12**. The fauna survey methods utilised across the multiple surveys are consistent with applicable Commonwealth and State fauna survey guidelines. Fauna surveys comprised various trapping methods, camera traps, diurnal bird surveys, spotlighting, call playback, habitat searches, micro bat echolocation detection surveys and supplementary micro bat surveys. All incidental and opportunistic observations of fauna made during the field surveys were recorded.

### 6.2.2.5 Habitat Quality Methods

Habitat assessment and mapping was undertaken in autumn 2023 for the relevant threatened fauna species and ecological communities in accordance with the ‘Guide to Determining Terrestrial Habitat Quality Version 1.3’ (DES 2020). The results of this assessment support the production of threatened species habitat maps.

The following assessments were conducted to inform the calculation of habitat quality:

- site based attributes (BioCondition methodology)
- landscape context attributes
- species habitat attributes.

Site based attributes, species habitat attributes and landscape context attributes were assessed at 35 habitat transects (Figure 6-2) throughout the proposed disturbance area.

### 6.2.2.6 Likelihood of Occurrence - Species

Based on desktop data, species potentially occurring within the survey area were assigned a likelihood of occurrence based on the knowledge of ecologists, species’ distribution, potential habitat suitability, known records and scientific literature. The likelihood of occurrence of the threatened species, based on



desktop analysis (i.e. prior to incorporating results of field surveys) within the survey area is provided in Appendix C of **Appendix 12** (flora) and Appendix D of **Appendix 12** (fauna). This is referred to as the ‘desktop likelihood of occurrence’.

Following targeted species and habitat surveys the likelihood of occurrence within the proposed disturbance area for species, with potential to occur through desktop analysis, has been further analysed to identify the species that are known, likely or have potential to occur.

### 6.2.3 Results

#### 6.2.3.1 Desktop - TECs

Four communities listed as endangered under the EPBC Act have been identified as potentially occurring within the New Lenton MLs or surrounds, namely:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC)
- Poplar Box Grassy Woodland on Alluvial Plains
- Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin (Natural Grasslands TEC)
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC).

No TECs listed as critically endangered or vulnerable have been identified within the New Lenton MLs or surrounds.

#### 6.2.3.2 Desktop – Listed Species

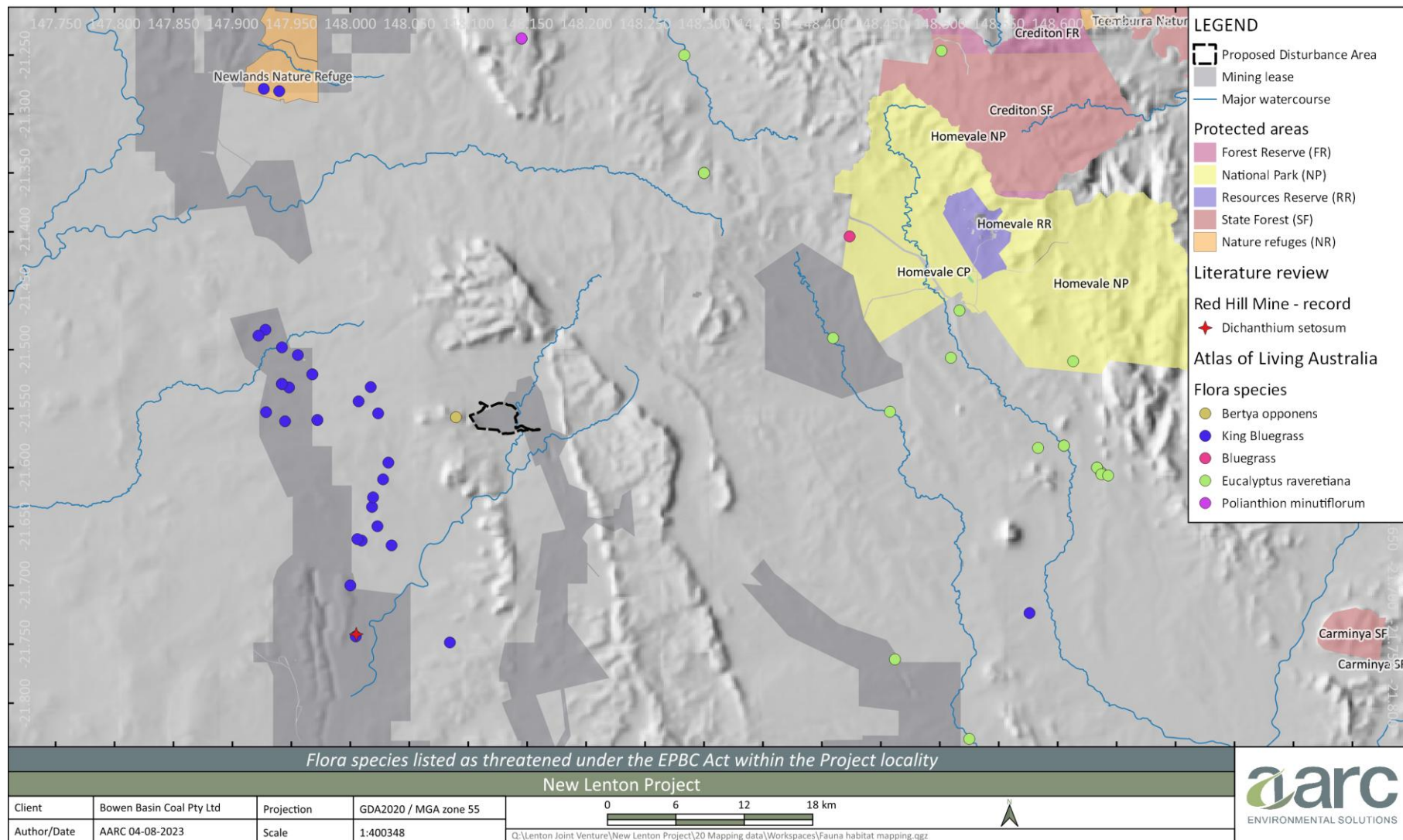
Ten flora and 24 fauna species listed as critically endangered, endangered or vulnerable under the EPBC Act were identified by the desktop assessment as potentially occurring within the survey area.

The desktop likelihood assessment concluded that four EPBC Act listed flora and six fauna species were classed as known, likely or potential to occur within the proposed disturbance area. Additionally, due to the specific requirement of the PER to address particular threatened species one additional fauna species (Ornamental Snake) was included for further assessment. These four flora and seven fauna species are listed in Table 6-2, and were targeted by the flora and fauna surveys. Desktop records of these species in the broader region are shown in Figure 6-3 (flora) and Figure 6-4 (fauna).

**Table 6-2 Desktop Assessment of Species Likelihood**

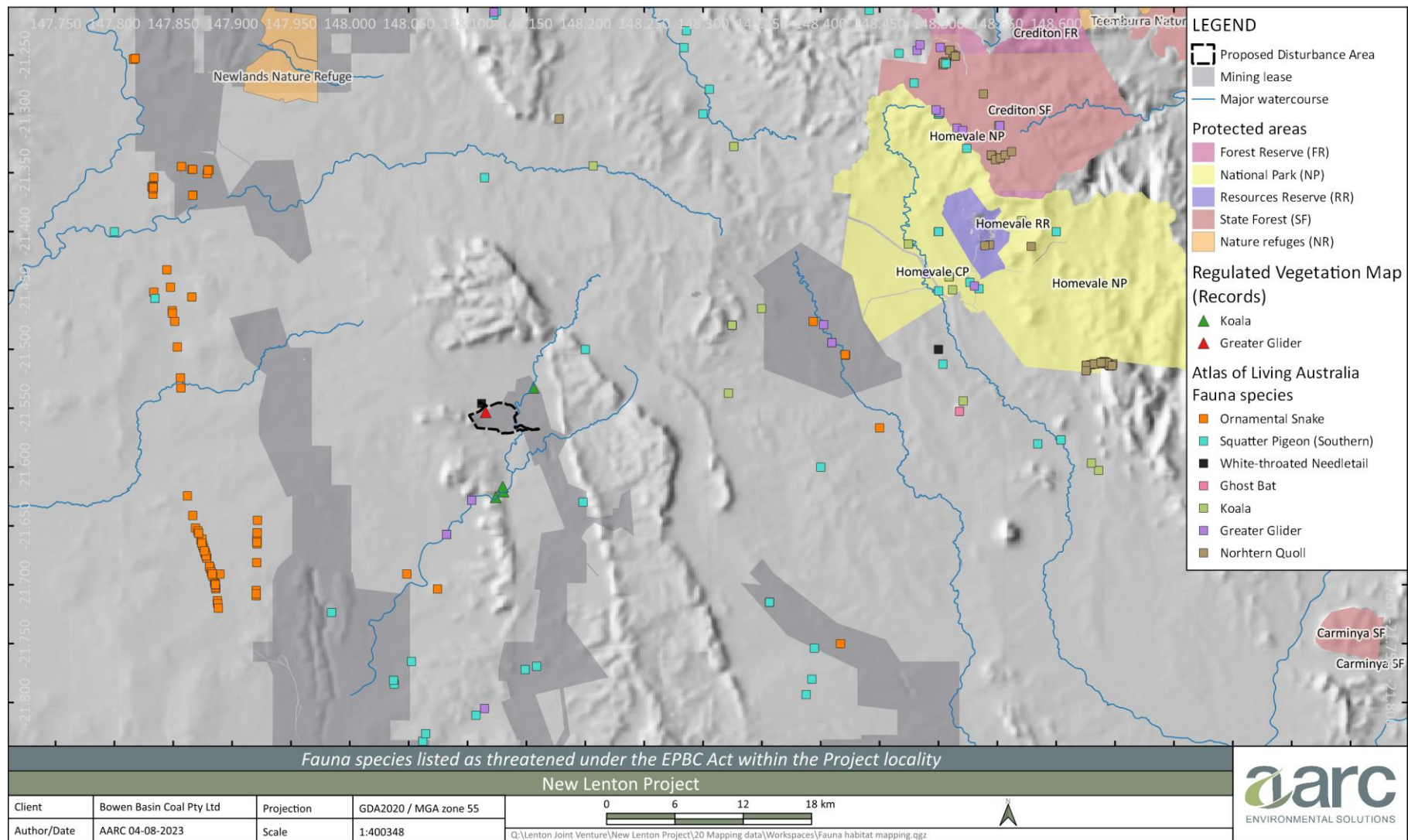
| Family          | Scientific Name                   | Common Name    | EPBC Act Status <sup>1</sup> | Likelihood of Occurrence - Desktop |
|-----------------|-----------------------------------|----------------|------------------------------|------------------------------------|
| <b>Flora</b>    |                                   |                |                              |                                    |
| Euphorbiaceae   | <i>Bertya oppositifolia</i>       |                | V                            | Potential                          |
| Poaceae         | <i>Dichanthium queenslandicum</i> | King Bluegrass | E                            | Potential                          |
| Poaceae         | <i>Dichanthium setosum</i>        | Bluegrass      | V                            | Potential                          |
| Rhamnaceae      | <i>Polianthion minutiflorum</i>   |                | V                            | Potential                          |
| <b>Fauna</b>    |                                   |                |                              |                                    |
| <i>Reptiles</i> |                                   |                |                              |                                    |

| Family                                                                                                                                                          | Scientific Name               | Common Name                 | EPBC Act Status <sup>1</sup> | Likelihood of Occurrence - Desktop        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------|------------------------------|-------------------------------------------|
| Elapidae                                                                                                                                                        | <i>Denisonia maculata</i>     | Ornamental Snake            | V                            | Unlikely, but listed in the PER guideline |
| <i>Birds</i>                                                                                                                                                    |                               |                             |                              |                                           |
| Apodidae                                                                                                                                                        | <i>Hirundapus caudacutus</i>  | White-throated Needletail   | V, Mi                        | Known                                     |
| Columbidae                                                                                                                                                      | <i>Geophaps scripta</i>       | Squatter Pigeon (Southern)  | V                            | Likely                                    |
| <i>Mammals</i>                                                                                                                                                  |                               |                             |                              |                                           |
| Dasyuridae                                                                                                                                                      | <i>Dasyurus hallucatus</i>    | Northern Quoll              | E                            | Potential                                 |
| Phascolarctidae                                                                                                                                                 | <i>Phascolarctos cinereus</i> | Koala <sup>^</sup>          | V                            | Likely                                    |
| Pseudocheiridae                                                                                                                                                 | <i>Petauroides volans</i>     | Greater Glider <sup>^</sup> | V                            | Known                                     |
| Megadermatidae                                                                                                                                                  | <i>Macroderma gigas</i>       | Ghost Bat                   | V                            | Potential                                 |
| <sup>1</sup> E = Endangered; V = Vulnerable; Mi = migratory<br><sup>^</sup> Koala and Greater Glider status was Vulnerable at the time of the Referral decision |                               |                             |                              |                                           |



**Figure 6-3 Threatened Flora Species Records within Broader Region of the Project**





**Figure 6-4 Threatened Fauna Species Records within Broader Region of the Project**

### 6.2.3.3 Field Vegetation Community Results

Fourteen vegetation communities have been identified across the survey area during the field surveys based on field results and state government vegetation mapping. Nine of these vegetation communities occur in the proposed disturbance area. The vegetation communities within the survey area are summarised in Table 6-3 and shown on Figure 6-5. Section 4.2.1 of **Appendix 12** provides detailed descriptions of these vegetation communities.

Approximately 490 ha in the proposed disturbance area is not associated with remnant or high-value regrowth (HVR) vegetation. Instead, there are cleared areas with a sparse, shrubby layer of tree species below 1 m such as Brigalow, *Terminalia oblongata* or Poplar Box and a ground layer of introduced pasture species (predominantly Buffel Grass). These areas are actively grazed by landholders and regularly cleared. These areas are described as cleared agricultural areas and include grassland areas dominated by introduced pasture species.

**Table 6-3 Field Verified Vegetation Communities**

| Map unit                                                               | Vegetation community                                                                                                                                | Associated RE | VM status <sup>1</sup> | Act status <sup>2</sup> |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------|-------------------------|
| <b>Vegetation communities within the proposed disturbance area</b>     |                                                                                                                                                     |               |                        |                         |
| VC1                                                                    | Poplar box ( <i>Eucalyptus populnea</i> ) woodland on alluvial plains                                                                               | 11.3.2        | Of Concern             | Endangered              |
| VC2                                                                    | Moreton Bay ash ( <i>Corymbia tessellaris</i> ) woodland on alluvial plains                                                                         | 11.3.4        | Of Concern             | -                       |
| VC3                                                                    | Corymbia spp. woodland with sparse shrub layer on sandy duplex soils                                                                                | 11.3.7        | Least Concern          | -                       |
| VC4                                                                    | Blue gum ( <i>Eucalyptus tereticornis</i> ) open woodland fringing drainage lines on sandy-loam soils                                               | 11.3.25       | Least Concern          | -                       |
| VC5                                                                    | Narrow-leaved ironbark ( <i>Eucalyptus crebra</i> ) woodland on alluvial plains                                                                     | 11.3.36       | Of Concern             | -                       |
| VC6                                                                    | Mountain coolibah ( <i>Eucalyptus orgadophila</i> ) open woodland on basaltic clays                                                                 | 11.8.5        | Least Concern          | -                       |
| VC7                                                                    | Shrubby Poplar box open woodland on fine-grained sedimentary soils                                                                                  | 11.9.7a       | Of Concern             | -                       |
| VC8                                                                    | Lancewood ( <i>Acacia shirleyi</i> ) low forest on sandstone escarpment                                                                             | 11.10.3       | Least Concern          | -                       |
| VC9                                                                    | Eucalyptus and Corymbia spp. with Acacia spp. woodland on coarse-grained sedimentary rocks                                                          | 11.10.4a      | Least Concern          | -                       |
| NA                                                                     | Cleared agricultural land                                                                                                                           | NA            | NA                     | -                       |
| <b>Vegetation communities outside of the proposed disturbance area</b> |                                                                                                                                                     |               |                        |                         |
| VC10                                                                   | Brigalow ( <i>Acacia harpophylla</i> ) open woodland with emergent Dawson River Blackbutt ( <i>Eucalyptus cambageana</i> ) on weathered brown clays | 11.9.1        | Endangered             | -                       |

| Map unit                                       | Vegetation community                                                          | Associated RE           | VM Act status <sup>1</sup> | EPBC status <sup>2</sup> |
|------------------------------------------------|-------------------------------------------------------------------------------|-------------------------|----------------------------|--------------------------|
| VC11                                           | Mountain Coolibah woodland to open woodland on fine-grained sedimentary rocks | 11.9.2                  | Least Concern              | -                        |
| VC12                                           | Poplar box open forest on weathered brown clays                               | 11.9.10                 | Of Concern                 | -                        |
| VC13                                           | Brigalow sucker regrowth on undulating clay soils                             | Non remnant (NR) 11.9.5 | NA                         | -                        |
| VC14                                           | <i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks.             | 11.8.11                 | Of Concern                 | -                        |
| 1 Endangered; Of Concern; Least Concern        |                                                                               |                         |                            |                          |
| 2 Endangered TEC - If meets the TEC thresholds |                                                                               |                         |                            |                          |







#### 6.2.3.4 Field Flora Results

A total of 336 flora native species have been recorded during the field surveys; this represents 64 families. Despite extensive surveys, including traverses (meanders) of potentially suitable habitat, over several years and seasons, no endangered, vulnerable, or near threatened flora species under the EPBC Act have been identified within the survey area. Based on the field surveys the following four flora species identified in Table 6-2 (based on desktop data) as having to potential to occur, are considered unlikely to occur:

- *Bertya opposens*
- *Dichanthium queenslandicum*, King Bluegrass
- *Dichanthium setosum*, Bluegrass
- *Polianthion minutiflorum*.

Further information supporting the assessment that these four flora species are unlikely to occur is provided in Section 4.2.5 of **Appendix 12**. A complete list of flora species recorded is provided in Appendix F of **Appendix 12**, together with their conservation status under the EPBC Act.

#### 6.2.3.5 Introduced Flora

A total of 56 introduced flora species were identified during the field surveys. Historically, the survey area has been used for cattle grazing, and as such, areas of high disturbance are present. Six flora species were identified on site that are classified as restricted under the Biosecurity Act (Queensland) and by the Australian Government as a Weed of National Security (WoNS) based on their invasiveness, potential for spread and environmental, social, and economic impacts. These species are Parthenium, Lantana, Rubber Vine, Prickly Acacia, Prickly Pear, and Velvety Tree Pear. Additionally, the *Harrisia Cactus (Harrisia martinii)*, also found within the survey area, is listed as restricted under the Biosecurity Act (Queensland). A large percentage of the proposed disturbance area has undergone clearing to develop improved pastureland. As a result, favourable conditions for weeds have led to local dominance of exotic grasses and other weeds.

#### 6.2.3.6 Field TEC Results

Within the proposed disturbance area, only one vegetation community has been found to contain areas consistent with the key diagnostic characteristics of the Poplar Box Grassy Woodland on Alluvial Plains TEC, namely the remnant Poplar Box woodland on alluvial plains vegetation community (VC1). Most of this vegetation community met the structure requirements for this TEC, either as Class A2 (best quality), Class B (good quality) or as Class C (moderate quality). Some patches do not meet the relevant criteria due to the one or more of the following:

- low native species cover and/or low species diversity in the ground layer
- shrub layer and subcanopy layer (<10m) cover over 30%, or
- patches that don't meet the thresholds and are separated from another patch of Poplar Box by a gap greater than 30 m wide.

The following TECs, and vegetation associated with these TECs, were not identified during surveys within the proposed disturbance area:

- Brigalow TEC
- Natural Grassland TEC
- SEVT TEC.

#### 6.2.3.7 Field Habitat Results

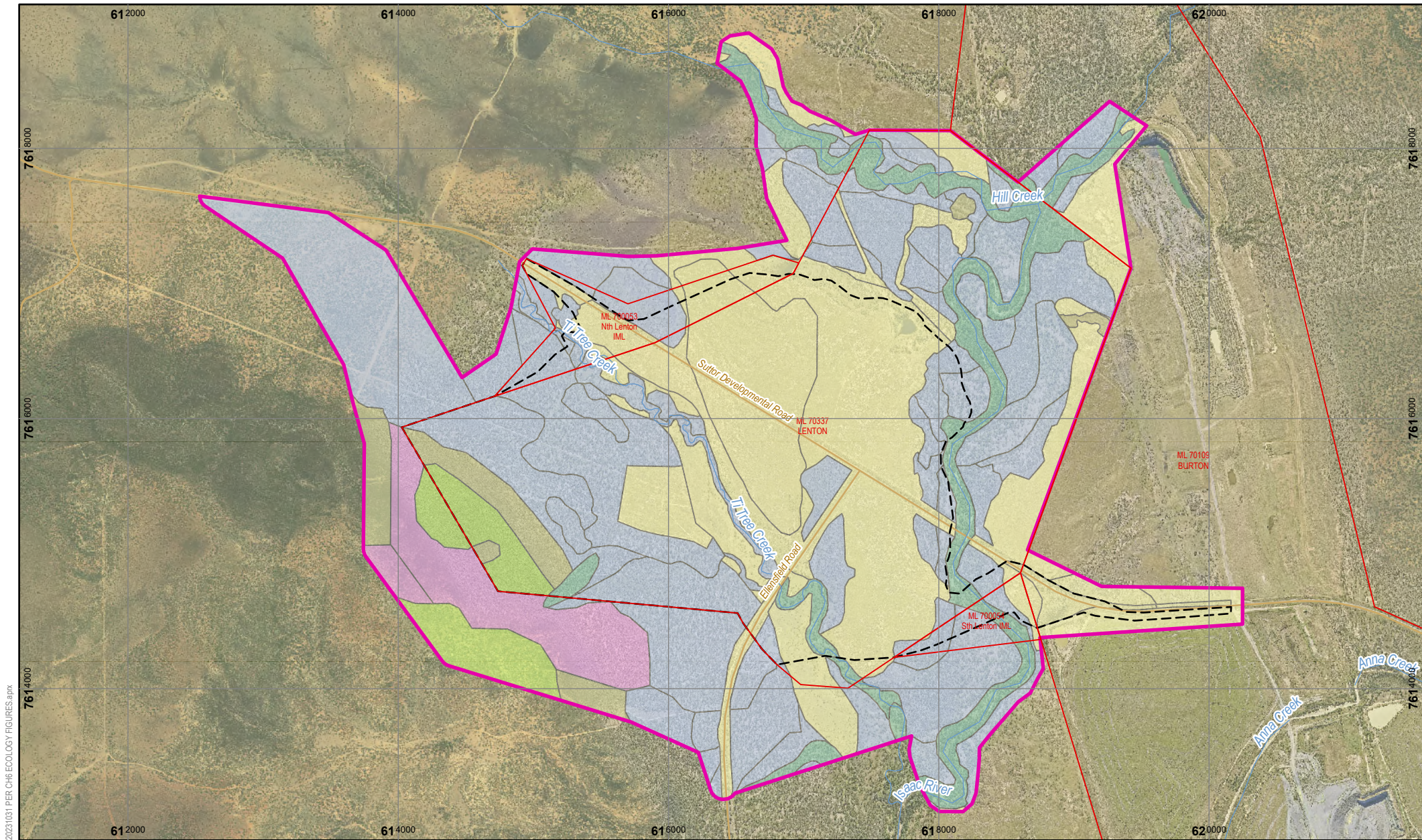
Field surveys identified five habitat types for fauna within the survey area:

- Eucalypt open forest along main creeks

- Eucalypt dry woodlands on low land
- Eucalypt dry woodlands on escarpments
- Acacia woodlands
- Cleared agricultural areas.

These habitat types are described in detail in Section 4.3.1 of **Appendix 12**, and shown in Figure 6-6.







### 6.2.3.8 Field Fauna Results

A total of 170 native vertebrate species were identified during the field surveys, comprising seven amphibians, 35 reptiles, 92 birds and 36 mammals (of which, 21 confirmed micro-bat species). A description of the amphibian, reptile, bird, and mammal assemblages within the survey area is provided in Sections 4.3.2 of **Appendix 12**, with a complete list of fauna species recorded provided in Appendix G of **Appendix 12**.

No gilgais or deep cracking soil (suitable habitat for the Ornamental Snake) was identified within the survey area, despite numerous surveys. Further, the drainage lines within the survey area, Isaac River, Hill Creek and Ti-Tree Creek are ephemeral, with a sandy creek bed unlikely to hold water for long enough periods for frog species to breed. Surveys undertaken by Burton Coal Mine personnel in July 2023, following a period of rains, confirmed no pooling areas along the Isaac River. It is concluded therefore, that no suitable habitat for the Ornamental Snake has been identified within the survey area.

Two species of conservation significance under the EPBC Act have been recorded within the survey area, namely the Greater Glider and the Squatter Pigeon (Southern).

Following field surveys, the likelihood of occurrence of fauna species identified through desktop analysis as potentially occurring in Table 6-2, was further analysed. Table 6-4 provides the likelihood of occurrence of fauna species within the proposed disturbance area following field surveys and desktop assessment.

**Table 6-4      Field Survey – Likelihood of Occurrence**

| Family     | Scientific Name/Common Name                                   | EPBC Act Status <sup>1</sup> | Likelihood of Occurrence - Field Surveys                                                                                                                                                                                                                                                                                                  |
|------------|---------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elapidae   | <i>Denisonia maculata</i><br>Ornamental Snake                 | V                            | <b>Unlikely</b><br>No Ornamental Snake records or observation of suitable habitat was recorded within the survey area, despite targeted surveys across seasons. This species is therefore considered unlikely to occur within the proposed disturbance area.                                                                              |
| Apodidae   | <i>Hirundapus caudacutus</i><br>White-throated Needletail     | V, Mi                        | <b>Known</b><br>Desktop searches identify one record of the species within the proposed disturbance area.                                                                                                                                                                                                                                 |
| Columbidae | <i>Geophaps scripta scripta</i><br>Squatter Pigeon (Southern) | V                            | <b>Known</b><br>The species was recorded during the Autumn 2023 field assessment.<br><br>A flock of around 13 individuals was recorded as incidentals in a track near Hill Creek during the spring 2018 survey, which targeted the Greater Glider while one individual was recorded south of Ti-Tree Creek during the autumn 2023 survey. |

| Family                                                                                            | Scientific Name/Common Name                  | EPBC Act Status <sup>1</sup> | Likelihood of Occurrence - Field Surveys                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dasyuridae                                                                                        | <i>Dasyurus hallucatus</i><br>Northern Quoll | E                            | <b>Unlikely</b><br>Despite extensive fauna surveys over several years and seasons, including targeted survey effort, the Northern Quoll has not been identified within the survey area and is considered unlikely to occur within the proposed disturbance area.                                                                                |
| Phascolarctidae                                                                                   | <i>Phascolarctos cinereus</i><br>Koala       | V                            | <b>Likely</b><br>The species was not recorded during the field assessments. However, desktop searches identified one record adjacent to the survey area, and habitat for the species has been identified within the proposed disturbance area. It is therefore considered likely the species uses habitat within the proposed disturbance area. |
| Pseudocheiridae                                                                                   | <i>Petauroides volans</i><br>Greater Glider  | V                            | <b>Known</b><br>The species was recorded during several field assessments.<br><br>57 Greater Gliders were observed, 15 during the autumn 2017 survey, 4 during the autumn 2018 survey and 38 during the spring 2018 survey, which targeted the Greater Glider.                                                                                  |
| Megadermatidae                                                                                    | <i>Macroderma gigas</i><br>Ghost Bat         | V                            | <b>Unlikely</b><br>Despite extensive fauna surveys over several years and seasons, including targeted survey effort, the Ghost Bat has not been identified within the survey area and is considered unlikely to occur within the proposed disturbance area.                                                                                     |
| 1 EPBC Act conservation status at the time of the referral (2019): V = Vulnerable; Mi = migratory |                                              |                              |                                                                                                                                                                                                                                                                                                                                                 |

#### 6.2.3.9 TECs and Species Considered in Impact Assessments

Based on the assessment using desktop and field survey data, the following listed TECs and species, which are known, likely or have potential to occur have been considered in significant impact assessments:

- Poplar Box Grassy Woodland on Alluvial Plains TEC
- Greater Gilder
- Koala
- Squatter Pigeon (Southern)
- White-throated Needletail.

Listed TECs or species which have been assessed as unlikely to occur are not considered in significant impact assessments.



Section 5 of **Appendix 12** provides a detailed description of these five TECs and species, including desktop data, survey effort, survey outcomes, condition assessment (TEC) and habitat assessment (species). This has resulted in the development of a TEC and species habitat maps.

Habitat mapping for the Greater Glider, Koala, Squatter Pigeon (Southern) and White-throated Needletail within the survey area is informed by the habitat assessment undertaken during the surveys, aerial imagery obtained from the area at 1 m resolution collected in June 2022, state vegetation mapping, and information contained in the SPRAT database, including the relevant statutory documents and published research.

Furthermore habitat mapping for the Greater Glider and Koala have been informed by the more recent species conservation advice for *Petauroides volans* (Greater Glider (southern and central)) (DCCEEW 2022), the National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DAWE 2022b) and the Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (DAWE, 2022a).

#### **6.2.3.10 Poplar Box Grassy Woodland on Alluvial Plains TEC**

This ecological community, listed as endangered under the EPBC Act, occurs west of the Great Dividing Range, typically at less than 300 m above sea level (ASL) and between latitudes 20°S to 34°S within the Brigalow Belt North, Brigalow Belt South, South East Queensland, Cobar Peneplain, Darling Riverine Plains, NSW South-western Slopes and Riverina IBRA bioregions (DCCEEW 2023).

The Poplar Box Grassy Woodland on Alluvial Plains TEC typically comprises a grassy woodland with a canopy dominated by Poplar Box and an understorey mostly of grasses and other herbs. The ecological community mostly occurs in gently undulating to flat landscapes and occasionally on gentle slopes on a wide range of soil types of alluvial and depositional origin (DoEE 2019). Within Queensland, five REs have the potential to represent the Poplar Box Grassy Woodland on Alluvial Plains TEC, namely RE 11.3.2, RE 11.3.17, RE 11.4.7, RE 11.4.12 and RE 12.3.10.

The Poplar Box Grassy Woodland on Alluvial Plains TEC has the following structure:

- a grassy woodland to grassy open woodland with a tree crown cover of 10% or more at patch scale;
- a tree canopy present that shows the following features:
  - canopy tree species that are capable of reaching 10 m or more in height; and
  - *Eucalyptus populnea* (Poplar Box) present in the canopy and the dominant tree species;
- low mid layer (1–10 m) crown cover of shrubs to small trees—about 30% or less; and
- ground layer (<1 m) mostly dominated across a patch by native grasses, other native herbs and sometimes chenopods.

Where hybrids of Poplar Box are present with other *Eucalyptus* spp., they have been counted as part of the *Eucalyptus populnea* component of the tree canopy when assessing the previous criterion.

A list of native plants associated with this TEC is provided in Appendix A of the Conservation Advice (DoEE 2019c).

Key threats to the Poplar Box TEC include (DoEE 2019):

- clearance and fragmentation
- invasive weeds and pests
- inappropriate fire and grazing regimes
- dieback
- chemical impact and spray drift
- invasive fauna

- hydrological changes and salinization
- nutrient enrichment
- climate change.

A total of 14 plots were assessed within the confirmed patches of VC1 (Poplar box woodland on alluvial plains). The condition assessment identified the following classes of TEC condition within the survey area:

- Category A2 (highest quality), in patches where the crown cover was recorded as over 10%, circa 80% of perennial vegetation cover in the ground was native and more than 30 native species were recorded within the patch;
- Category B (good quality), in patches where the where the crown cover was recorded as over 10%, over 50% of perennial vegetation cover in the ground was native and more than 20 native species were recorded within the patch; and
- Category C (moderate quality), in patches where the ground cover was dominated by non-native perennial species (>50%), but the presented more than 20 native species in the ground layer, more than 10 mature trees per hectare over 30 cm diameter breast height (dbh), and evidence of Poplar Box (or hybrids of Poplar Box with other Eucalyptus species) periodic recruitment.

Poplar Box Grassy Woodland on Alluvial Plains TEC within the survey area comprised Category A2 (highest quality), Category B (good quality) and Category C (moderate quality). The distribution of the Poplar Box Grassy Woodland on Alluvial Plains TEC patches is shown on Figure 6-7.

#### 6.2.3.11 Greater Glider

##### 6.2.3.11.1 Species Description

The Greater Glider was listed as vulnerable under the EPBC Act at the time of the referral decision. Since this time, the listing status for the Greater Glider has been upgraded to endangered under the EPBC Act. The updated conservation advice for the Greater Glider has been considered for the habitat assessment for the species.

This assessment is applicable to the Greater Glider (southern and central) (*Petauroides volans*) as referred to on the DCCEEW Species Profiles and Threats database (DCCEEW 2023). The species is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1,200 m above sea level (DCCEEW 2022).

The Greater Glider is an arboreal, nocturnal marsupial known to occur in Eucalypt dominated habitats in eastern Australia (DCCEEW 2022). It is primarily folivorous, with a diet mostly comprising Eucalypt leaves and occasionally flowers. Preferred habitat consists of taller, montane, moist Eucalypt forests with relatively old trees and abundant hollows. It also favours forests with a diversity of Eucalypt species due to seasonal variation in its preferred tree species (DCCEEW 2022). During the day, this species shelters in tree hollows, with a particular selection for large hollows in large old trees (DCCEEW 2022) and requires at least two hollow bearing trees for every 2 ha of suitable forest habitat (DCCEEW 2022, Kerswell et al. 2020).

The species is absent from cleared areas and has little dispersal ability to move between fragments through cleared areas. Greater Gliders have been recorded in habitat patches <10 ha. However, population viability in small remnants is low due to the species' low reproductive output, susceptibility to disturbance and edge effects (DCCEEW 2022).

Threats to the Greater Glider include (DCCEEW 2022):

- inappropriate fire regimes
- habitat clearing and fragmentation
- timber harvesting
- barbed wire fencing (entanglement)

- increased temperatures and changes to rainfall patterns
- hyper-predation by owls
- competition from Sulphur-crested Cockatoos
- predation by Feral Cats
- predation by European Red Foxes.

#### 6.2.3.11.2 Habitat Assessment

Habitat mapping for the Greater Glider within the survey area is informed by the habitat assessment undertaken during the surveys, the new species conservation advice (DCCEEW 2022), aerial imagery obtained from the area at 1 m resolution collected in June 2022, state vegetation mapping, and information contained in the SPRAT database, including the relevant statutory documents and published research.

The latest conservation advice for the species identifies factors to consider when identifying habitat that is critical to the survival of the species (DCCEEW 2022):

- large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region
- smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization
- cool microclimate forest/woodland areas (e.g. protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes)
- areas identified as refuges under future climate changes scenarios
- short-term or long-term post-fire refuges (i.e. unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas.

The species conservation advice indicates that a dbh >30 cm can be used as a proxy where hollows cannot be detected, citing a publication by Eyre et al. 2021. However, the Guide to Greater Glider Habitat in Queensland (Eyre et al. 2022) specifies that the denning trees are characterised by a dbh >50 cm, and that the average of large tree dbh thresholds available for almost half of the regional ecosystems identified as Greater Glider habitat is dbh >46 cm. This assessment has considered the more recent publication by Eyre et al. 2022 when applying dbh for the species habitat.

The key habitat features for Greater Gliders are:

- sufficient continuous canopy cover of Eucalyptus species for the species dispersal
- presence of mature hollow-bearing trees with suitably sized and aged hollows
- presence of a range of the species preferred food species.

The habitat description provided in Table 6-5 has been prepared in view of the key habitat features and the positive correlation between tree hollows, Eucalyptus spp. canopy cover and Greater Glider abundance (DCCEEW 2022 and survey results).

While not all the habitat assessed as potential habitat for the Greater Glider meets the conditions for habitat critical to the species' survival, the high presence of Greater Glider within the survey area means that the areas mapped as suitable habitat for the species can also be considered critical to the survival of the species. Habitat critical to the survival of the Greater Glider therefore includes preferred habitat and suitable habitat as defined in Table 6-5.

The remaining areas within the survey area were assessed as unsuitable habitat (i.e. not critical to the survival) for the Greater Glider, are detailed in Table 6-6.

Greater Glider habitat mapping and survey records are shown in Figure 6-8. The habitat map for the Greater Glider (Figure 6-8) does not change if a 30 cm dbh is used, compared with a 46 cm dbh. When changing the threshold to 30 cm dbh in the parameters used for the species habitat assessment:



- The patches that were mapped as suitable habitat instead of critical habitat, remain suitable habitat based on ‘the lack of a range of preferred food tree species’.
- The patches of vegetation that have Eucalyptus trees above 30 cm dbh, but no trees above 46 cm dbh, do not meet the suitable or critical habitat criteria based on other factors, such as canopy cover.

**Table 6-5      Greater Glider Habitat Critical to the Survival of the Greater Glider**

| Habitat Description                                                                                                                                                                                                                                                                                                                                                                                                                      | Relevant features present within the survey area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Preferred habitat</b></p> <p>Greater Glider preferred habitat that may provide:</p> <ul style="list-style-type: none"> <li>• Eucalyptus woodland continuous canopy to facilitate the species dispersion (above 20% of canopy cover);</li> <li>• More than 2 large hollows (or large tree (&gt;46dbh)) per hectare, required for denning; and</li> <li>• Presence of a range of preferred food tree species.</li> </ul>             | <p>Within the survey area, the preferred habitat for the species (critical habitat) corresponds to areas mapped as remnant Eucalypt open forest or woodlands, with continuous canopy, large hollows or hollow bearing trees and the presence of a range of food species. These communities tend to be along creeks and floodplains, with more fertile soils and are:</p> <ul style="list-style-type: none"> <li>• Riparian open forest along the Isaac River and the Hill Creek (RE 11.3.25);</li> <li>• Eucalypt grassy woodlands on alluvial plains (most of RE 11.3.2, RE 11.3.4, RE 11.3.36, one section of RE 11.3.7 near a drainage line to the southwest of the survey area, surrounded by preferred habitat); and</li> <li>• The area limited to the denser canopy along the Ti-Tree Creek that connects to the Isaac River, located south of Ellensfield Road.</li> </ul> |
| <p><b>Suitable habitat</b></p> <p>Greater Glider preferred habitat that may provide:</p> <ul style="list-style-type: none"> <li>• Eucalyptus woodland continuous canopy to facilitate the species dispersion (above 20% of canopy cover); and</li> <li>• More than 2 large hollows (or large tree (&gt;46dbh)) per hectare, required for denning;</li> <li>• But lack the presence of a range of preferred food tree species.</li> </ul> | <p>Areas that meet the Eucalypt canopy cover and hollow-bearing tree density criteria, but don’t have enough preferred food species, are considered suitable habitat for the Greater Glider. This area corresponds to the Eucalypt dry woodlands on lowland and are:</p> <ul style="list-style-type: none"> <li>• Eucalypt woodland with sparse canopy and dense understorey (corresponding with RE 11.3.7, RE 11.9.10 and most of RE 11.9.7a); and</li> <li>• The area limited to the denser canopy along the Ti-Tree Creek, north of Ellensfield Road.</li> </ul>                                                                                                                                                                                                                                                                                                                |

**Table 6-6 Other Habitat not Critical to the Survival of the Greater Glider**

| Habitat Description                                                                                                                                                                                                                                                                                                                                                                                          | Relevant features present within the survey area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Habitat is considered unsuitable (not critical) for the Greater Glider if:</p> <ul style="list-style-type: none"> <li>the canopy is not continuous <i>Eucalyptus</i> spp., or it is not dense enough for the species to disperse; and</li> <li>does not present hollow bearing trees nor trees with dbh &gt; 46 cm; or</li> <li>does not contain Eucalypt food species for the Greater Glider.</li> </ul> | <p>Some areas have been assessed as unsuitable for the Greater Glider within the survey. These communities, shown in Figure 6-5, are:</p> <ul style="list-style-type: none"> <li>Non-remnant vegetation, unless specified above, due to the absence of mature hollow bearing trees and/or sufficient canopy density and height to facilitate the species dispersal (including HVR);</li> <li>One small patch of Poplar Box open woodland (RE 11.3.2) between a farm dam and the Ellensfield Road, to the southwest of the survey area with no hollow bearing trees and a very sparse canopy;</li> <li>Acacia dominated vegetation communities, such as RE 11.10.3 and RE 11.9.1; and</li> <li>Eucalypt woodland in sandstone escarpments with scattered patches of Acacia-dominated vegetation (RE 11.10.4a) on top of the sandstone escarpment. No food tree species for the Greater Glider were recorded in this woodland, which is also disconnected from the rest of the continuous Eucalypt open forest and woodland by Acacia spp. woodland (RE 11.10.3) on the slopes.</li> </ul> |

### 6.2.3.12 Koala

#### 6.2.3.12.1 Species Description

The Koala was listed as vulnerable under the EPBC Act at the time when the referral decision was made for the Project. Since this time, the listing status for the Koala has been upgraded to endangered under the EPBC Act. The updated conservation advice for the Koala has been considered for the habitat assessment for the species

Koalas are a semi-arboreal marsupial that is endemic to Australia (DAWE 2022a, ANU 2021). They live along the eastern coast of Australia. The species distribution spans from coastal to semi-arid climate to the west (DAWE 2022a and DAWE 2022b).

Due to their wide distribution, koala habitat preferences can differ between local populations and are unable to be generalised. The Koala is a specialist folivore and preferred habitats are primarily dominated or associated with *Eucalyptus* spp., which are their primary food source (ANU 2021). They can, however, feed on other foliage including *Corymbia* spp. and *Angophora* spp. and can be found outside of the geographic range of *Eucalyptus* spp. The Koala is primarily nocturnal and can be found sleeping on tree branches with no distinction made between foraging and sheltering trees (ANU 2021). The 'National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)' (DAWE 2022b) defines a patch of habitat as 'all the necessary resources for the persistence of a population and that is separated from other patches by inhospitable habitat'.

Females commonly live until 13-14 years and have been documented to live till 18 years in the wild, while males generally live until 12 years old (DAWE 2022a and DAWE 2022b). Koalas reach sexual maturity between 2-3 years for females and 4 years for males with most births occurring between October and May (DAWE 2022a). Females will usually produce one offspring per year with variability in reproduction occurring from differences in seasonality between northern and southern populations (DAWE 2022a and DAWE 2022b). Joeys will travel with their mum until they reach approximately 12 months old and are weaned during periods of favourable climatic conditions and high resource availability (DAWE 2022b).

The main threats to Koalas are urban expansion, disease, habitat loss, fragmentation and degradation, vehicle strike, predation by feral dogs, drought, and climate change (DAWE 2022a; DAWE2022b and ANU 2021).

No threat abatement plans have been developed, adopted, or identified as relevant for the Koala (DCCEEW 2023b).

#### 6.2.3.12.2 Habitat Assessment

Habitat mapping for the Koala within the survey area is informed by the habitat assessment undertaken during the surveys, aerial imagery obtained from the area at 1 m resolution collected in June 2022, and information contained in the SPRAT database, including the relevant statutory documents and published research. The results of the field surveys, in Table 6-7, describe: the different vegetation types in the survey area; estimate the density of Eucalyptus and Corymbia tree species per hectare; estimate the density of important food trees per hectare; and estimate the ancillary habitat tree species per hectare in each area. This information was used to identify the habitat critical to the survival of the Koala, and the habitat not critical to the survival of the species. It is based on the criteria described in the species conservation advice for the species (DAWE 2022a).

**Table 6-7      Estimated Tree Density Per Hectare for Dominant Habitat Type within the Survey Area**

| Habitat type                                                                                                                                                                                                                         | Number of sites | Important food spp. density/ha <sup>#</sup> | Ancillary habitat spp. density/ha <sup>#</sup> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------|------------------------------------------------|
| RE 11.3.25                                                                                                                                                                                                                           | 3               | 71.3                                        | 38                                             |
| RE 11.3.36                                                                                                                                                                                                                           | 2               | 85                                          | 27                                             |
| RE 11.3.2                                                                                                                                                                                                                            | 10              | 71.8                                        | 3.8                                            |
| RE 11.3.4                                                                                                                                                                                                                            | 4               | 1.5                                         | 66                                             |
| RE 11.3.7                                                                                                                                                                                                                            | 3               | 6.7                                         | 36.7                                           |
| non-remnant thin vegetated drainage line along Ti-Tree Creek south of the road (HVR RE 11.3.25)                                                                                                                                      | 1               | 16                                          | 28                                             |
| RE 11.8.5                                                                                                                                                                                                                            | 1               | 28                                          | 14                                             |
| RE 11.9.7a                                                                                                                                                                                                                           | 2               | 77                                          | 1                                              |
| Non-remnant RE 11.9.7a near junction                                                                                                                                                                                                 | 1               | 36                                          | 0                                              |
| Non-remnant RE 11.8.5 patch adjacent to Ti-Tree Creek                                                                                                                                                                                | 1               | 26                                          | 0                                              |
| Non-remnant thin vegetated drainage line along Ti-Tree Creek north of the road (HVR 11.3.7)                                                                                                                                          | 1               | 6                                           | 6                                              |
| RE 11.10.3                                                                                                                                                                                                                           | 2               | 6                                           | 0                                              |
| RE 11.10.4a                                                                                                                                                                                                                          | 2               | 0                                           | 0                                              |
| Patch of non-remnant RE 11.8.5 north of survey area                                                                                                                                                                                  | 2               | 2                                           | 1                                              |
| * including all Eucalypt and Corymbia species                                                                                                                                                                                        |                 |                                             |                                                |
| # for the assessed important food tree species included Eucalyptus tereticornis, E. crebra, E. orgadophila and E. populnea and ancillary tree species included Corymbia tessellaris, Corymbia dallachiana and Corymbia erythrophloia |                 |                                             |                                                |



Survey data indicates remnant vegetation within the survey area is dominated by *Myrtaceae* (Table 6-8), including trees preferentially used by the Koala for foraging (*E. tereticornis*, *E. crebra*, *E. orgadophilla* and *E. populnea* (Kerswell et al. 2020)) or ancillary habitat trees (*Corymbia tessellaris*, *C. dallachiana* and *C. erythrophloia* (ANU 2021)). Within the survey area, most of the habitat types indicate a high density of foraging and shelter tree species (Table 6-7). Therefore, most of the vegetated area, with the exception of three habitat types characterised by minimal or no foraging or shelter tree species, has been assessed as potentially suitable habitat for the Koala, as described in Table 6-8 and shown in Figure 6-9.

The species conservation advice for the species identifies factors to consider when identifying Koala habitat that is critical for the survival of the species (DAWE 2022a):

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

In most habitats within the survey area, this includes a high density preferentially used for foraging (*E. tereticornis*, *E. crebra*, *E. orgadophilla* and *E. populnea* (Kerswell et al. 2020, ANU 2021)) or ancillary habitat trees (*Corymbia tessellaris*, *C. dallachiana* and *C. erythrophloia* (ANU 2021)).

While all areas of vegetation with dense preferred feed trees have the potential to support comparatively high Koala numbers, given the vegetation structure and occurrence within the landscape, RE 11.3.25 may play a more important ecological role for the local population. Koalas show a preference for tree species on more fertile soils with higher leaf nutrient status and possibly high leaf moisture, especially during times of drought or heat stress (DAWE 2022a). Koalas are also susceptible to extreme temperatures (DAWE 2022a) and will select trees which provide better thermal regulation. Such trees are often located in gullies and/or have thicker canopies. It is likely vegetation in RE 11.3.25 meets these criteria, as it is within close proximity to creek lines (increasing the likelihood of high leaf moisture) and has a comparatively tall, dense canopy. Furthermore, this vegetation is linear, following major creek lines (Isaac River and Hill Creek) and may, therefore, also play a dispersal/movement role. This habitat is consistent with several factors of the criteria to be considered habitat critical to the survival of the species defined in the species conservation advice (DAWE 2022a).

The remaining habitat mapped as suitable for the Koala (Table 6-8 and Figure 6-9) could also meet the criteria to constitute habitat critical to the survival of the species as described in the species conservation advice (DAWE 2022a) as it is likely to:

- be used to meet essential life cycle requirements; and
- be necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements.

Furthermore, the thin vegetated area along Ti-Tree Creek, in the section north of Ellensfield Road, has fewer food or ancillary tree species, but due to its location along the creek, it is likely to provide a necessary corridor for the species. Therefore, it is considered critical to its survival.

Habitat for Koala has been mapped for the survey area based on the relevant features for Koala habitat critical to the survival of the species as discussed, and as described in Table 6-8 and shown in Figure 6-9. Habitat critical to the survival of the species comprises ‘important ecological function habitat’ and ‘suitable habitat’ in Table 6-8.

**Table 6-8 Koala Habitat Critical to the Survival of the Species**

| Habitat Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Relevant features present within the survey area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Important ecological function habitat</b></p> <p>Koala habitat that may provide:</p> <ul style="list-style-type: none"> <li>refugial habitat features, such as food trees on more fertile soils with higher leaf nutrient status, higher leaf moisture or with thicker canopies; these characteristics are especially important during periods of drought or heat stress; and</li> <li>connective function between otherwise discontinuous areas of suitable habitat.</li> </ul>                                                                                                                                                                                                                                                                                 | <p>Within the survey area, areas mapped as Eucalypt open forest, with continuous canopy dominated by refuge trees (<i>Eucalyptus tereticornis</i>) have been identified as potential important ecological function habitat. These areas have been identified in riparian habitat along the Isaac River and Hill Creek.</p>                                                                                                                                                                                                                                                                                           |
| <p><b>Suitable habitat</b></p> <p>Koala habitat is any forest or woodland that contains known koala food tree species, or shrubland with emergent food trees. A Koala food tree includes species from the <i>Eucalyptus</i>, <i>Corymbia</i>, <i>Angophora</i>, <i>Lophostemon</i> and <i>Melaleuca</i> genera (DAWE 2022a).</p> <p>Additionally, woodlands with a high density of ancillary koala trees within the vicinity of habitats deemed important or suitable, are also considered suitable for the species. Non-food trees such as Brigalow and Sally Wattle have been utilised by this species for daytime roosting. A potential Koala habitat tree is considered to be a tree with a trunk diameter greater than 10 cm at 1.3m above ground (ANU 2021).</p> | <p>Within the survey area, areas mapped as remnant vegetation communities with high food or ancillary habitat trees density, are considered to provide potential suitable habitat for the Koala. These communities include:</p> <ul style="list-style-type: none"> <li>Eucalypt grassy woodlands on alluvial plains; and</li> <li>Eucalypt woodland with sparse canopy and dense understorey;</li> <li>The area limited to the denser canopy along the Ti- Tree Creek, south of Ellensfield Road; and</li> <li>The area limited to the denser canopy along the Ti- Tree Creek, north of Ellensfield Road.</li> </ul> |

In addition, based on the survey results detailed in Table 6-7, and in the context of the local landscape, this assessment identifies other vegetated areas that do not meet the requirements to be considered habitat critical to the survival of the Koala. Using the species conservation advice (DAWE 2022a) as the basis for not meeting the requirements to be considered habitat critical to the survival of the species, these vegetated areas (referred to as ‘other habitat’ and ‘unsuitable habitat’) are further described and assessed against the criteria below and summarised in Table 6-9. ‘Other habitat’ that is not critical to the survival of the species is shown on Figure 6-9, and is described as:

- Eucalypt and Acacia woodland (mostly Lancewood) on the sandstone escarpment located to the west the survey area (in Table 6-7, referred to as RE 11.10.4a) with no food or ancillary tree species. Within the local landscape, this habitat is unlikely to:
  - be used during periods of stress (examples: flood, drought or fire), as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes) as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be used by important populations, as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be necessary to maintain genetic diversity and long-term evolutionary development as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment; and
  - be critical to the survival of a listed threatened species or a listed threatened ecological community as it lacks food and ancillary trees; and there is abundant and continuous habitat for the species in the surrounding areas below the escarpment.
- Lancewood woodland on the sandstone escarpment located to the west the survey area (in Table 6-7, referred to as RE 11.10.3). Within the local landscape, this habitat is unlikely to:
  - be used during periods of stress (examples: flood, drought or fire) due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes) due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be used by important populations due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be necessary to maintain genetic diversity and long-term evolutionary development due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment;
  - be necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment; and



- be critical to the survival of a listed threatened species or a listed threatened ecological community due to the minimal and very patchy presence of food or ancillary trees in the area, whilst there is abundant and continuous habitat for the species in the surrounding areas below the escarpment.
- One patch of very sparse regrowth vegetation of RE 11.8.5 north of the Suttor Developmental Road (in Table 6-7). This patch is heavily disturbed, with very few food or ancillary tree species, dieback is present, and does not provide a connection with another patch of vegetation. Within the local landscape, this habitat is unlikely to:
  - be used during periods of stress (examples: flood, drought or fire), due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species;
  - be used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes) due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species;
  - be used by important populations, due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species;
  - be necessary to maintain genetic diversity and long-term evolutionary development due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species;
  - be necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species;
  - be necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species; and
  - be critical to the survival of a listed threatened species or a listed threatened ecological community due to the minimal presence of food or ancillary trees, as well as minimal protection against predators. This patch is isolated, surrounded by a vast area of cleared agricultural land. In the context of the local landscape, it is not necessary for movement of the species.

**Table 6-9      Other Habitat Not Critical to The Survival of the Koala**

| Habitat Description                                                                                                                                                                                                                                                                                                                         | Relevant features present within the survey area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Other habitat</b></p> <p>Koala habitat with sub-suitable food or ancillary tree species density or lack of protection against predators.</p>                                                                                                                                                                                          | <p>Within the survey area, areas mapped as remnant or non-remnant vegetation communities with food and ancillary tree species density less or equal than 6 trees per ha are not considered to provide habitat critical to the survival of the species. These communities include:</p> <ul style="list-style-type: none"> <li>• Eucalypt and Acacia woodland (mostly Lancewood) on sandstone escarpment with no food or ancillary tree species;</li> <li>• Lancewood woodland on sandstone escarpment; and</li> <li>• One patch of very sparse regrowth vegetation of RE 11.8.5 to the north of the Suttor Developmental Road with dieback and very few food or ancillary tree species.</li> </ul> <p>As detailed above, the thin vegetated area along Ti-Tree Creek, in the section north of Ellensfield Road has a low density of food or ancillary tree species, but due to its location along the creek, it is likely to provide a necessary corridor for the species. Therefore, it is considered 'suitable habitat' that is critical to its survival.</p> |
| <p><b>Unsuitable habitat</b></p> <p>Unsuitable habitats are cleared agricultural areas and some regrowth areas. While Eucalypt regrowth can be suitable for the Koala, the cleared agricultural areas within the survey area contain low Brigalow regrowth, or Poplar Box regrowth below 1.5 m tall, which is unsuitable for the Koala.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

### 6.2.3.13 Squatter Pigeon

#### 6.2.3.13.1 Species Description

Squatter Pigeons are a ground dwelling species of bird measuring approximately 30 cm in length and weighing up to 250 g at maturity. The Squatter Pigeon has two subspecies: northern and southern. The southern subspecies tend to have larger bodies and more blue-grey colouring around their eyes than the northern subspecies, which are more yellowy-orange.

The southern subspecies of Squatter Pigeon (*Geophaps scripta scripta*), herein Squatter Pigeon, is listed as vulnerable under the EPBC Act.

The geographic distribution of the Squatter Pigeon extends from the Burdekin-Lynd divide in the southern region of Cape York in the north down to the Border Rivers region of New South Wales (NSW) (DCCEEW 2023). This species habitat is typically found within 3 km of a waterbody in remnant, regrowth, or partially modified vegetation communities. These include open forests, sparse open woods, and scrub that are dominated by Eucalyptus, Corymbia, Acacia, or Callitris species.

Squatter Pigeons breed in solitary pairs, producing up to two broods per year (DCCEEW 2023). Peak breeding season is early to mid- dry season (May-June). They can breed throughout the year if conditions are good, however optimal conditions are likely in the dry season when food sources are abundant.

Suitable breeding habitats occur on stony rises of sandy or gravelly soils located within 1 km of a suitable waterbody (DCCEEW 2023). Typically, the ground-cover vegetation for both foraging and breeding habitats consists of native perennial tussock grasses or mixtures of perennial tussock grasses and shrubs or forbs. The Squatter Pigeon consumes seeds from several Acacia species, grasses, herbs, and shrubs. The subspecies also prefers to forage and dust-bathe on bare ground under an open canopy of trees. The subspecies is considered unlikely to move far from woodland trees, which provide protection from predatory birds. Where scattered trees still occur, and the distance of cleared land between remnant trees or patches of habitat does not exceed 100 m, individuals may be found foraging in, or moving across modified or degraded environments.

The Squatter Pigeon is likely to be sedentary or locally nomadic (DCCEEW 2023), residing near permanent water bodies and reliable food sources. When dispersed between breeding and foraging habitat, forests of woodland within range of a water source represent preferred habitat.

The Squatter Pigeon is listed under the EPBC Act as a vulnerable species. Threats to the Squatter Pigeon include (DCCEEW 2023):

- vegetation clearing and fragmentation
- habitat degradation by overgrazing by stock (especially cattle) and feral herbivores such as rabbits
- habitat degradation by the establishment of weeds and introduced pasture species including Buffel Grass
- predation by species including the Fox, Dingo (*Canis familiaris dingo*), and Feral Cat.

Threat abatement plans relevant to the Squatter Pigeon have been developed for the Feral Cat, Fox and Rabbit.

#### 6.2.3.13.2 Habitat Assessment

Habitat mapping for the Squatter Pigeon within the survey area is informed by the habitat assessment undertaken during the surveys, aerial imagery obtained from the area at 1 m resolution collected in June 2022, and information contained in the SPRAT database, including the relevant statutory documents and published research.

Habitat mapping for the Squatter Pigeon within the survey area is shown on Figure 6-10 and is based on the habitat descriptions outlined in Table 6-10.

Potential permanent, semi-permanent and seasonal water sources (watercourses and farm) within the survey area were assessed to determine their suitability as a water source for the Squatter Pigeon breeding and foraging. The habitat assessment involved observations of the characteristics of the potential water source, the ground cover and other microhabitat features in areas surrounding the water source.



**Table 6-10      Squatter Pigeon Habitat Description and Occurrence**

| Habitat description                                                                                                                                                                                                                                                                                                            | Relevant features present within the survey area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Potential for breeding</b>                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Remnant or regrowth open forest, woodland, open woodland or scrub, with relatively sparse (<33%) groundcover vegetation, typically an overstorey dominated by <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Acacia</i> or <i>Callitris</i> species within 1 km of suitable permanent or semi-permanent water bodies (DCCEEW 2023b). | <p>Available literature suggests Squatter Pigeons have the potential to nest in areas of suitable habitat within 1 km of a permanent or semi-permanent water source.</p> <p>Areas mapped as remnant vegetation and high-value regrowth vegetation within the survey area provide suitable overstorey and groundcover for the Squatter Pigeon (subject to weather and grazing pressure). However, most areas of remnant and high-value regrowth within the site have been identified as having a dense ground cover vegetation (&gt;33%) (subject to weather and grazing conditions).</p> <p>Permanent or semi-permanent water bodies identified within the survey area include all farm dams. Applying the 1 km buffer around these sources suggests breeding opportunity is possible within areas with the right substrate and &lt;33% groundcover (shown in Figure 6-10).</p> <p>The ephemeral watercourses, Isaac River, Hill Creek, and Ti-Tree Creek are characterised by sandy substrates. While water can be present in these streams following large rainfall events/flooding, the water quickly disappears within days. Surveys undertaken by Burton Coal Mine personnel in July 2023, following a period of rains, confirmed no pooling areas along the Isaac River. These streams do not provide a semi-permanent or permanent water source for the Squatter Pigeon.</p> |
| <b>Suitable foraging habitat</b>                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Habitat description                                                                                                                                                                                                                                                                                                               | Relevant features present within the survey area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Remnant or regrowth open forest, woodland, open woodland or scrub with relatively sparse (&lt;33%) groundcover vegetation, typically an overstorey dominated by <i>Eucalyptus</i>, <i>Corymbia</i>, <i>Acacia</i> or <i>Callitris</i> species within 3 km of suitable permanent, semi-permanent, or seasonal water bodies.</p> | <p>Areas mapped as remnant vegetation and high-value regrowth vegetation within the survey, that present &lt;33% groundcover (shown in Figure 6-10), have been mapped as suitable habitat where the vegetation occurs within 3 km of suitable permanent, semi-permanent, or seasonal water sources.</p> <p>The suitable water sources include those described above in ‘potential for breeding’. The ephemeral streams, Isaac River, Hill Creek, and Ti-Tree Creek are considered not to provide a suitable seasonal source of water.</p> <p>Grass cover in the cleared agricultural areas is typically much greater than 33% and unsuitable foraging habitat for the Squatter Pigeon. There is some opportunity for Squatter Pigeon to forage in the immediate vicinity of farm dams, where cattle grazing prohibits grass growth, and along property access tracks. However, these areas are considered unlikely to provide extensive foraging opportunities for the species.</p> |
| Dispersal habitat                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>Any forest or woodland occurring between patches of foraging or breeding habitat and suitable waterbodies—includes areas of cleared land less than 100 m wide linking areas of suitable breeding or foraging habitat.</p>                                                                                                      | <p>Dispersal habitat has been defined to include any remnant and regrowth open forest or woodland occurring between patches of foraging and breeding habitat and areas of cleared land (less than 100 m wide) that link areas of suitable habitat while providing protection to the species (DCCEEW 2023).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

#### 6.2.3.14 White-throated Needletail

##### 6.2.3.14.1 Species Description

The White-throated Needletail is listed as vulnerable and migratory under the EPBC Act.

The White-throated Needletail is a large migratory swift, widespread across eastern and south-eastern Australia during its non-breeding season in September/October (DCCEEW 2023). In eastern Australia, it has been recorded in all coastal regions of Queensland, extending inland to the western slopes of the Great Divide and occasionally onto adjacent inland plains. The species is considered to be widespread in eastern and south-eastern Australia, from the islands in Torres Strait south to Tasmania. One of two subspecies of White-throated Needletail occurs in Australia although both occur in the northern hemisphere.

Primarily an aerial species, this species is known to occur across a variety of habitats including wooded areas, open forests, and rainforests (DCCEEW 2023). Large tracts of native vegetation, particularly forest, is considered likely to be a key habitat requirement for this species. It has been observed flying over farmland, typically over partially cleared pasture or within remnant vegetation at the edge of paddocks

where it predominantly forages at cloud level along the edges of low-pressure systems. This species also forages in open habitats or recently disturbed areas feeding on a wide variety of insects (DCCEEW 2023), occasionally near ground level. White-throated Needletails seldom alight on the ground or other substrates to catch insects and have very occasionally been seen foraging by launching into the air from trees in pursuit of flying insects or clinging to flowers on eucalypts, searching for insects.

The species prefers to roost in forests and woodlands, both among dense foliage in the canopy or in tree hollows, as well as on bark or rock faces, and occasionally roost aerially (DCCEEW 2023).

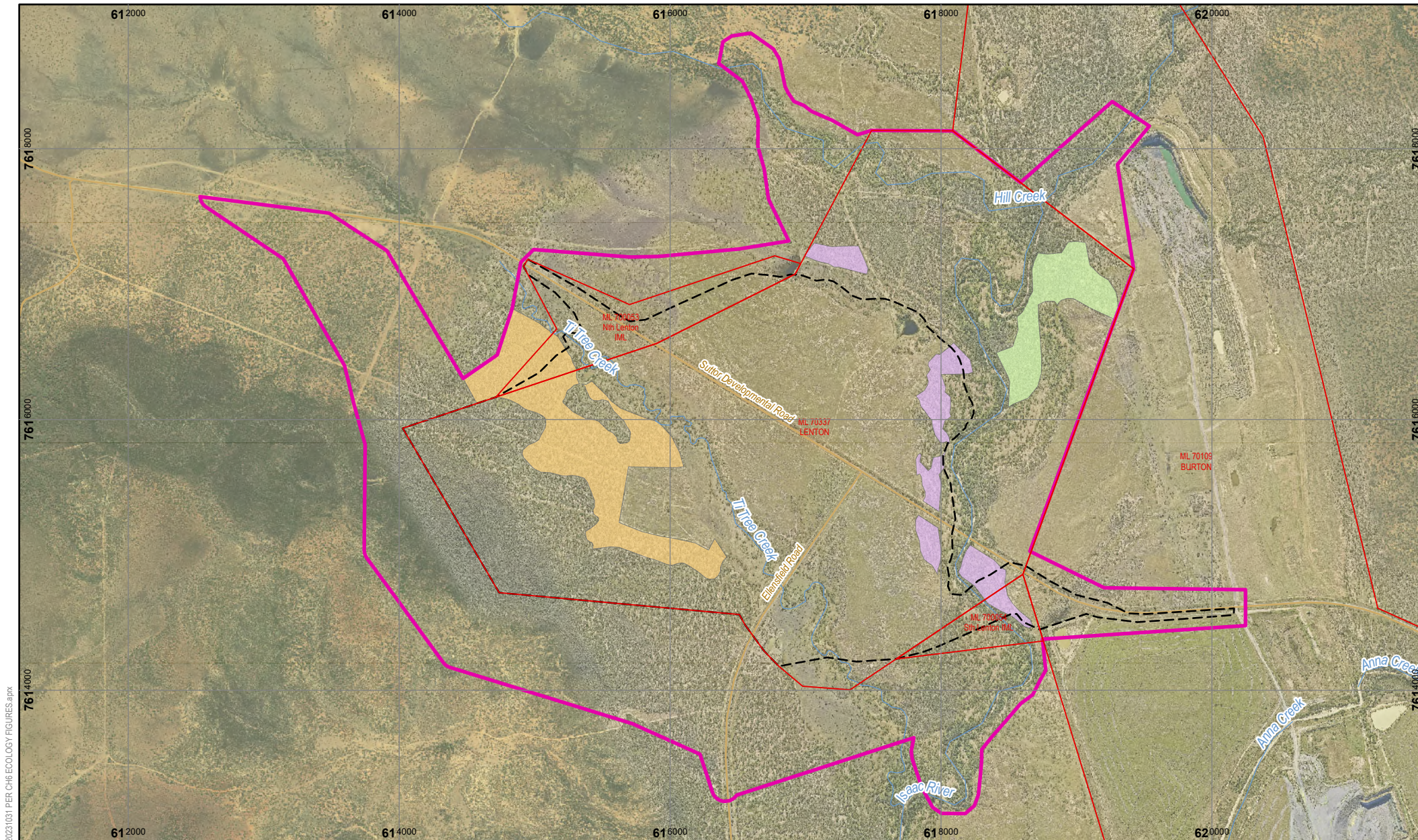
Potential threats to the White-throated Needletail include:

- collision with wind turbines and overhead wires
- use of insecticides
- habitat loss and fragmentation (breeding habitat or non-breeding habitat).

#### 6.2.3.14.2 Habitat Assessment

The White-throated Needletail does not breed in Australia. During the non-breeding season in Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1,000 m above the ground. While the species forages above most habitat types, the White-throated Needletail is predominantly recorded above wooded areas. Habitat for the species corresponds with all the major habitat types within the Project disturbance area except for cleared agricultural areas (Figure 6-11).



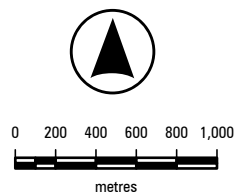


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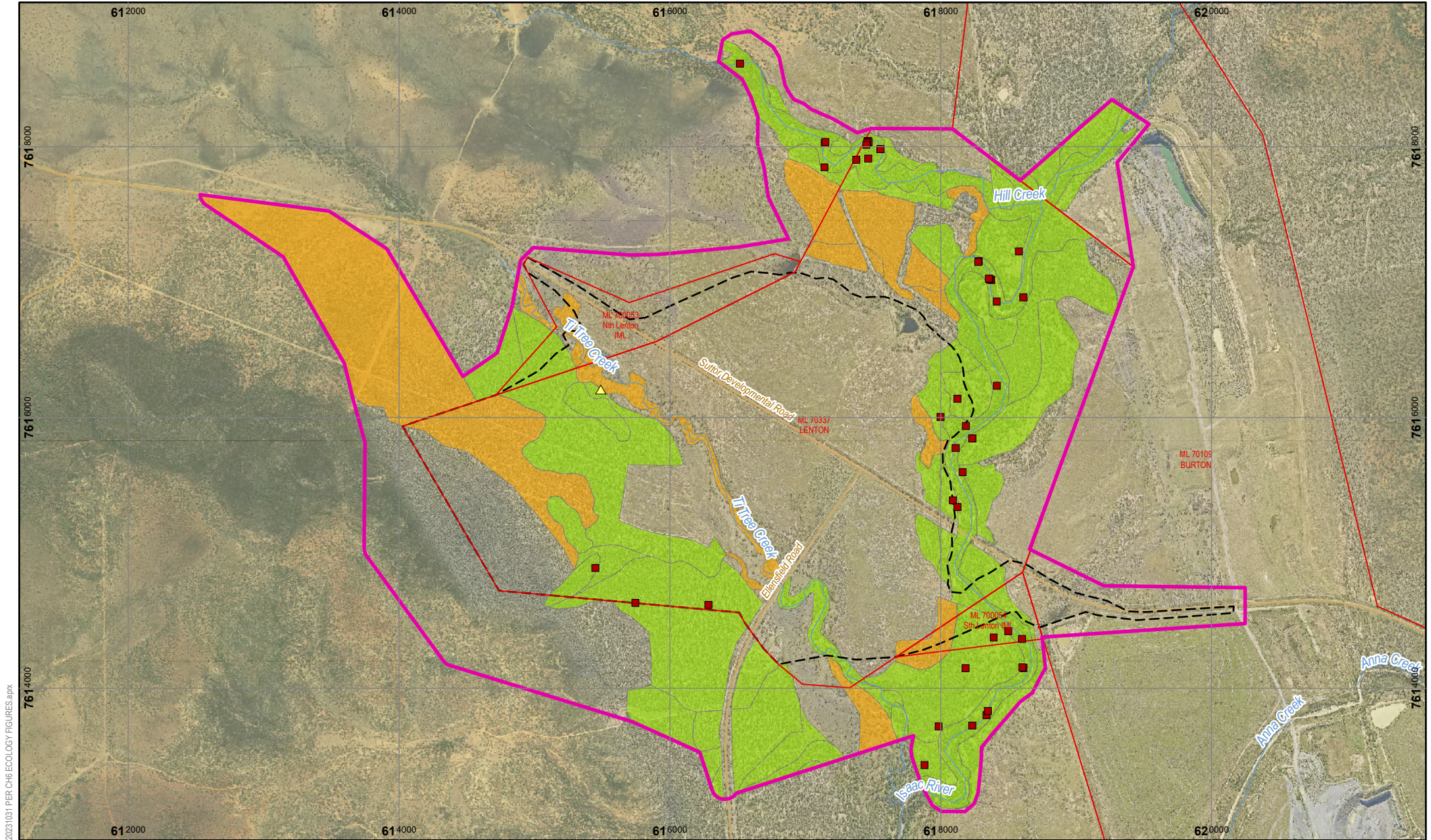


- |                                                                                                                                 |                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Legend</b>                                                                                                                   | <b>Poplar Box TEC</b>                                                                                             |
| <span style="border: 1px solid red; display: inline-block; width: 20px; height: 10px;"></span> Mining Lease                     | <span style="background-color: orange; display: inline-block; width: 20px; height: 10px;"></span> Category A2     |
| <span style="border: 1px dashed black; display: inline-block; width: 20px; height: 10px;"></span> Proposed Disturbance Boundary | <span style="background-color: lightgreen; display: inline-block; width: 20px; height: 10px;"></span> Category B  |
| <span style="border: 2px solid magenta; display: inline-block; width: 20px; height: 10px;"></span> Survey Area                  | <span style="background-color: lightpurple; display: inline-block; width: 20px; height: 10px;"></span> Category C |
| <span style="color: blue;">—</span> Waterway                                                                                    |                                                                                                                   |
| <span style="color: orange;">—</span> Roads                                                                                     |                                                                                                                   |

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Poplar Box Grassy Woodland on  
 Alluvial Plains within the Survey Area



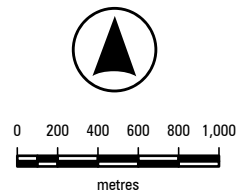


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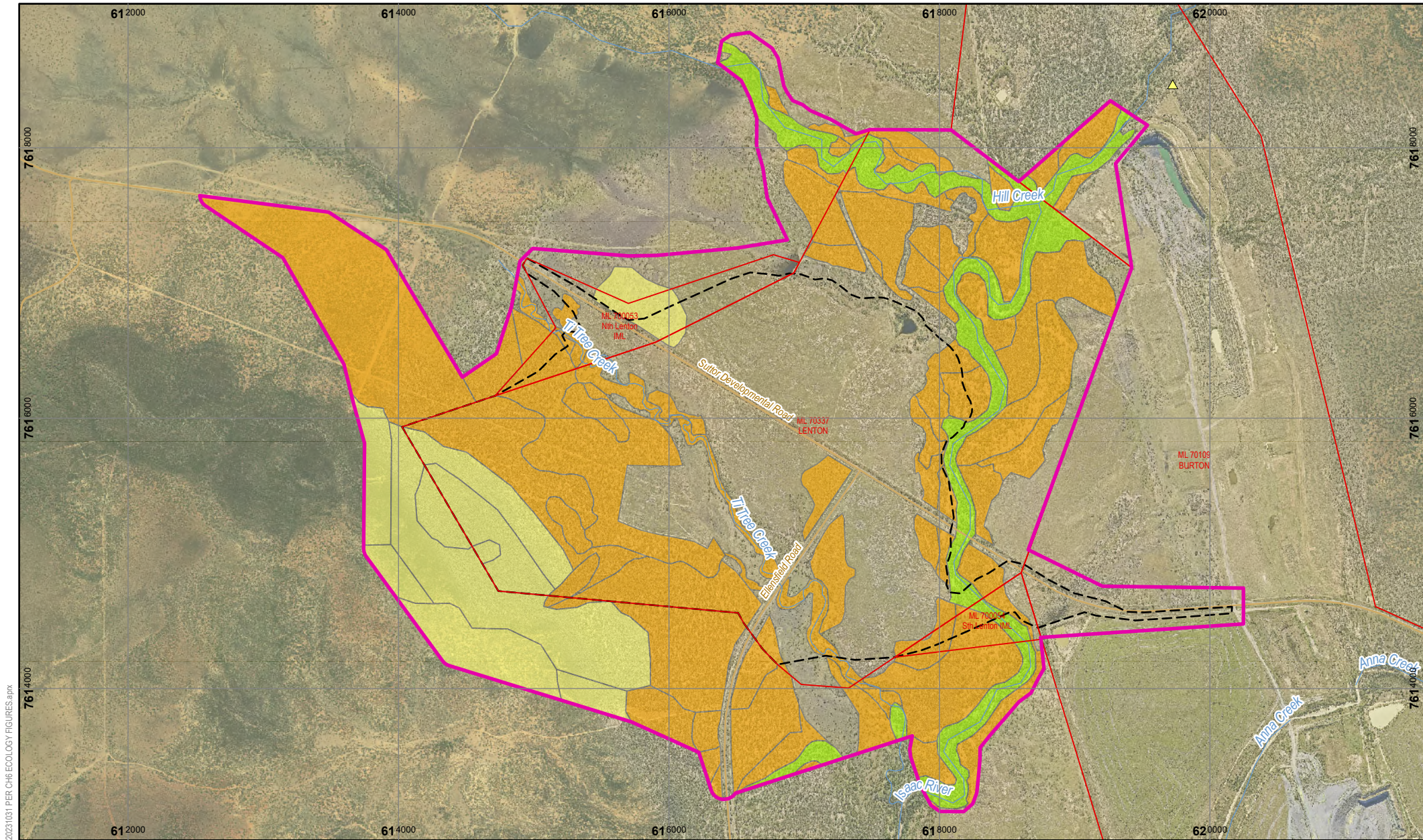


- Legend**
- Mining Lease
  - Proposed Disturbance Boundary
  - Survey Area
  - Waterway
  - Roads
  - Greater Glider Habitat Preferred
  - Greater Glider Habitat Suitable
  - Greater Glider Observations
  - Desktop Searches
  - ▲ Greater Glider Observations

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Greater Glider Habitat



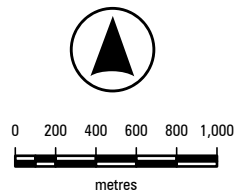


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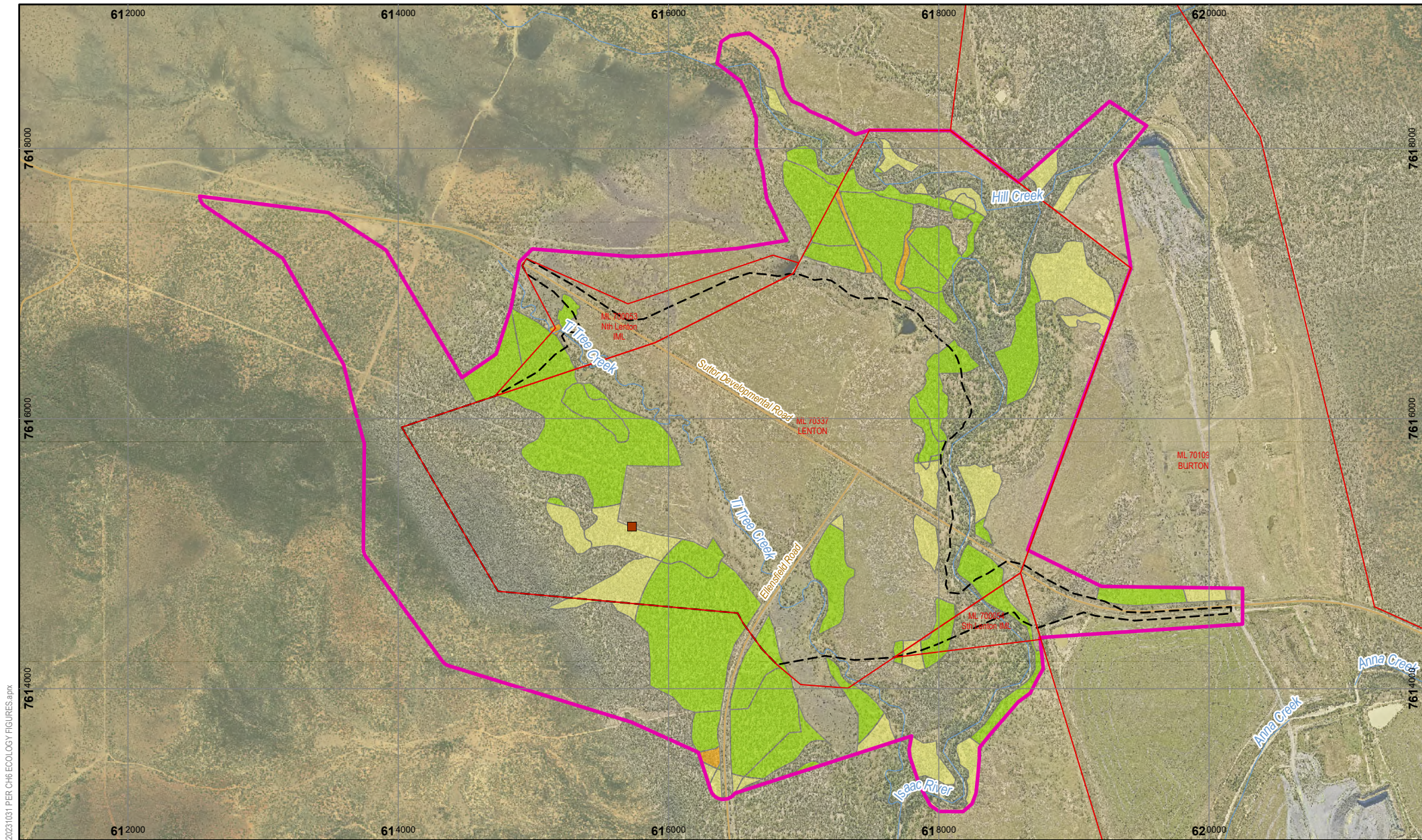
- |                                                                                                                                 |                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Legend</b>                                                                                                                   | <b>Koala Habitat</b>                                                                                                    |
| <span style="border: 1px solid red; display: inline-block; width: 20px; height: 10px;"></span> Mining Lease                     | <span style="background-color: #90EE90; display: inline-block; width: 20px; height: 10px;"></span> Critical - Important |
| <span style="border: 1px dashed black; display: inline-block; width: 20px; height: 10px;"></span> Proposed Disturbance Boundary | <span style="background-color: #FFD700; display: inline-block; width: 20px; height: 10px;"></span> Critical - Suitable  |
| <span style="border: 2px solid magenta; display: inline-block; width: 20px; height: 10px;"></span> Survey Area                  | <span style="background-color: #FFFF00; display: inline-block; width: 20px; height: 10px;"></span> Not Critical - Other |
| <span style="color: blue;">—</span> Waterway                                                                                    | <b>Desktop Searches</b>                                                                                                 |
| <span style="color: brown;">—</span> Roads                                                                                      | <span style="color: yellow;">▲</span> Koala Observations                                                                |

**NEW LENTON COAL PROJECT**  
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Koala Habitat

Figure | 6-9



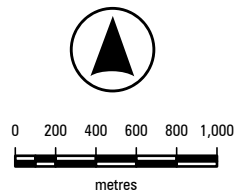


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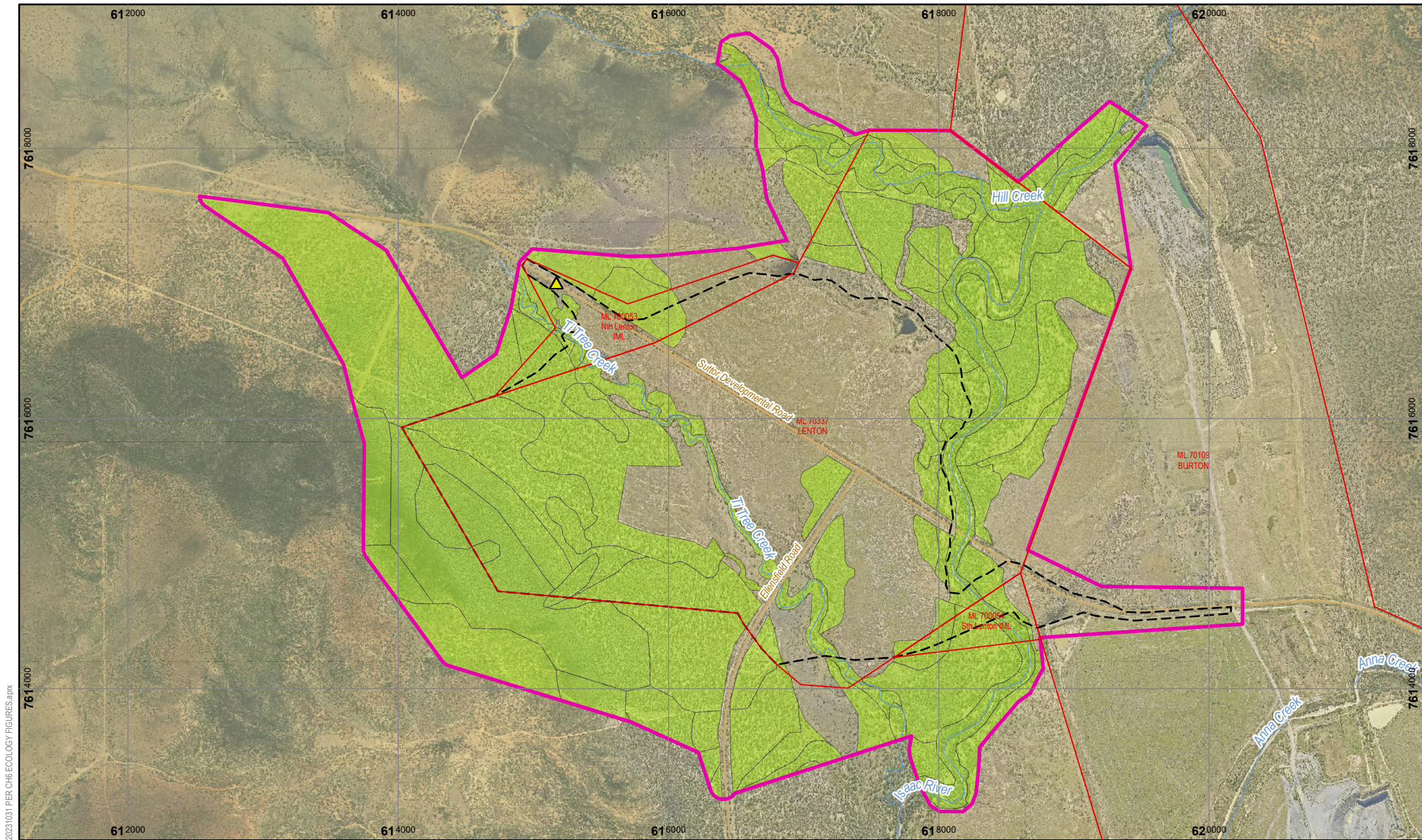


- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid red; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Mining Lease</li> <li><span style="border: 1px dashed black; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Proposed Disturbance Boundary</li> <li><span style="border: 2px solid magenta; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Survey Area</li> <li><span style="border-bottom: 1px solid blue; display: inline-block; width: 20px; margin-right: 5px;"></span> Waterway</li> <li><span style="border-bottom: 1px solid brown; display: inline-block; width: 20px; margin-right: 5px;"></span> Roads</li> </ul> | <p><b>Squatter Pigeon Habitat</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; margin-right: 5px;"></span> Breeding</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: #FFA500; margin-right: 5px;"></span> Dispersal</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: #FFFF00; margin-right: 5px;"></span> Foraging</li> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: #8B4513; margin-right: 5px;"></span> Squatter Pigeon Observation</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**NEW LENTON COAL PROJECT**  
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Squatter Pigeon Habitat



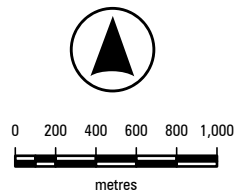


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- Legend**
- Mining Lease
  - Proposed Disturbance Boundary
  - Survey Area
  - Regional Features**
  - Waterway
  - Roads
  - White-throated Needletail habitat
  - Flyover Habitat
  - ▲ White-throated Needletail records
  - ▲ Desktop searches (Atlas of Living Australia)

**NEW LENTON COAL PROJECT**  
 Public Environment Report 2026

White-throated Needletail Habitat



## 6.2.4 Impact Assessment

### 6.2.4.1 Overview of Potential Impacts

The potential impacts of the Project on terrestrial flora and fauna, including identified MNES, and their habitats are:

- direct impacts through vegetation clearance and habitat disturbance
- indirect impacts including:
  - fragmentation and edge effects
  - weeds and pests
  - noise and vibration
  - dust
  - artificial lighting
  - vehicle strike
  - hydrological changes (i.e. surface water, flooding, groundwater drawdown)
  - erosion and sedimentation
  - bushfires
- cumulative impacts
- facilitated impacts.

### 6.2.4.2 Direct Impacts – Vegetation Clearance

Table 6-11 details the proposed clearance of each vegetation community and major habitat type identified within the proposed disturbance area. For comparative purposes the extent of each vegetation community within the survey area is also provided in Table 6-11. A total of 342.6 ha of remnant and 54.4 ha of HVR vegetation will be cleared as a result of the Project, while 489.2 ha (55.2 %) of the disturbance area will be located in cleared pastureland.

**Table 6-11 Proposed Disturbance of Vegetation Communities**

| Map unit                                                         | Vegetation community                                                                         | Associated RE | Extent within survey area (ha)* | Area of disturbance (ha) |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------|---------------------------------|--------------------------|
| Eucalypt open forest to woodlands along main creeks              |                                                                                              |               |                                 |                          |
| VC4                                                              | Blue gum (Eucalyptus tereticornis) open woodland fringing drainage lines on sandy-loam soils | 11.3.25       | 162.5                           | 11.5                     |
|                                                                  |                                                                                              |               | 15.2 (HVR)                      | 9.8 (HVR)                |
| Eucalypt dry woodlands on floodplains and fine sedimentary rocks |                                                                                              |               |                                 |                          |
| VC1                                                              | Poplar box (Eucalyptus populnea) woodland on alluvial plains                                 | 11.3.2        | 348.5                           | 113.7                    |
| VC2                                                              | Moreton Bay ash (Corymbia tessellaris) woodland on alluvial plains                           | 11.3.4        | 148.3                           | 14.6                     |
| VC3                                                              | Corymbia spp. woodland with sparse shrub layer on sandy duplex soils                         | 11.3.7        | 205.9                           | 61.9                     |
|                                                                  |                                                                                              |               | 25.9 (HVR)                      | 22 (HVR)                 |
| VC5                                                              | Narrow-leaved ironbark (Eucalyptus crebra) woodland on alluvial plains                       | 11.3.36       | 52.2                            | 50.4                     |
| VC6                                                              |                                                                                              | 11.8.5        | 2.9                             | 1.1                      |



| Map unit                                                                                                                                                                    | Vegetation community                                                                       | Associated RE | Extent within survey area (ha)* | Area of disturbance (ha) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------|---------------------------------|--------------------------|
|                                                                                                                                                                             | Mountain coolibah (Eucalyptus orgadophila) open woodland on basaltic clays                 |               | 27.59 (HVR)                     | 12.29 (HVR)              |
| VC7                                                                                                                                                                         | Shrubby Poplar box open woodland on fine-grained sedimentary soils                         | 11.9.7a       | 78.6                            | 27.2                     |
|                                                                                                                                                                             |                                                                                            |               | 23 (HVR)                        | 10.3 (HVR)               |
| Eucalypt dry woodland on sandstone escarpments                                                                                                                              |                                                                                            |               |                                 |                          |
| VC9                                                                                                                                                                         | Eucalyptus and Corymbia spp. with Acacia spp. woodland on coarse-grained sedimentary rocks | 11.10.4a      | 101.9                           | 29.4                     |
| Acacia woodlands                                                                                                                                                            |                                                                                            |               |                                 |                          |
| VC8                                                                                                                                                                         | Lancewood (Acacia shirleyi) low forest on sandstone escarpment                             | 11.10.3       | 151                             | 33                       |
| Cleared agriculture land                                                                                                                                                    |                                                                                            |               |                                 |                          |
| NA                                                                                                                                                                          | Cleared agricultural land                                                                  | NA            | 739.6                           | 489.2                    |
| Total                                                                                                                                                                       |                                                                                            |               |                                 | 886.4                    |
| *Mixed vegetation in the survey area (outside of the proposed disturbance) is calculated based on percentages of vegetation (e.g. polygons of 95% RE 11.3.2 and 5% 11.3.25) |                                                                                            |               |                                 |                          |

#### 6.2.4.3 Habitat Fragmentation

Vegetation clearing can result in a variety of environmental consequences, including habitat fragmentation reducing connectivity and reduced habitat value (through the impact of edge effects). Habitat fragmentation can impact both flora and fauna species. Often clearing activities form barriers that restrict and impair the movement of fauna species, resulting in lowered habitat connectivity.

Edge effects are impacts that occur along the boundary of natural or remnant vegetation and cleared or developed land. This boundary is exposed to increased light, wind shear and weed invasions augmenting the local environment (e.g. altered species and structural composition).

The west portion of the survey area contains a large contiguous area of remnant vegetation that provides fauna with significant dispersal opportunities. The areas of disturbance associated with Project activities are unlikely to increase the fragmentation and limit the opportunities for faunal dispersal through the woodland habitats.

Riparian corridors associated with Isaac River and Hill Creek, provide north–south fauna movement opportunities through the landscape for movement and dispersal, in particular the Koala and Greater Glider. The riparian vegetation along the Isaac River is mapped as state significant corridor.

The infrastructure associated with the Project includes two crossings on the Isaac River that can potentially compromise the species' ability to disperse along the riparian corridor:

- Bed level crossing of the Isaac River
- Suttor Developmental Road (a public road) realignment, with a new bridge over the Isaac River.

The current Suttor Developmental Road bridge crossing of the Isaac River is shown in the image below (Figure 6-12), with riparian vegetation flanking the crossing that is similar to upstream and downstream reaches. The realigned Suttor Developmental Road is expected to be similar following rehabilitation of the construction corridor.



**Figure 6-12**     *Current Suttor Developmental Road Crossing of the Isaac River*

#### **6.2.4.4 Weeds and Pests**

Introduced flora species are effective competitors for resources and have the potential to reduce the floristic structure and diversity of native plant communities. Introduced flora present in the survey area is described in Section 6.2.3.5. Activities that could introduce or spread weeds include soil disturbance and vehicle movements. Vegetation clearing can also result in ‘edge effects’, when the clearing activities cause modifications to the interface with natural habitats. A large percentage of areas to be directly disturbed by the Project are predominantly associated with cleared agricultural areas where introduced plants (such as Buffel grass) dominate the ground layer. Parthenium is the most common Biosecurity Act (Queensland)/WoNS weed species recorded throughout the survey area and occurs in higher densities within cleared agricultural areas and adjacent vegetation.

Six introduced fauna species that present risk to native fauna and their habitat have been recorded in the survey area: Cane Toad, Wild Dog, Feral Cat, House Mouse, Rabbit and Feral Pig.

Of relevance to these introduced species, the following are listed as key threatening processes under the EPBC Act:

- biological effects, including lethal toxic ingestion, caused by Cane Toads
- predation by Feral Cats



- predation, habitat degradation, competition and disease transmission by Feral Pigs
- competition and land degradation by rabbits.

#### 6.2.4.5 Noise, Vibration, Dust and Lighting

Noise and vibration associated with construction and operation of the Project has the potential to disrupt the routine activities of fauna species in close proximity to the operations. The noise impacts on the different habitats from the mining activities proposed to be undertaken will be minor given fauna often readily habituate in close proximity to continuous noise. While sudden noise (e.g. blasting activities) has the potential to startle native fauna, animals are likely to adapt to the disturbance and/or move to similar habitats in the surrounding landscape.

Open cut mining operations and exposed surface areas (e.g. windblown emissions from ROM stockpiles) have potential to result in the generation and dispersion of atmospheric dust. Studies have shown that excessive dust generation can impact the health and viability of surrounding vegetation. However, studies on the impacts of dust from unsealed roads on vegetation and fauna (Cumberland Ecology 2015; Jones et al. 2016) found no evidence that dust has any detrimental impacts on vegetation or fauna abundance.

Artificial lighting will be established for the Project including within the MIA and infrastructure corridor. Project lighting has the potential to affect behavioural patterns of some species. Some bird and bat species, for example, are attracted to insects around lights and could become prey for larger predators (e.g. owls). Artificial lighting can also attract predators and invasive pests, both of which may pose a threat to native fauna.

#### 6.2.4.6 Vehicle Strike

The movement of vehicles has the potential to increase the incidence of fauna mortality via vehicular strike. Ground-dwelling fauna are most susceptible to this potential impact. The risk of injury or mortality from vehicle strike is greatest where roads cross fauna movement corridors, such as the Isaac River.

#### 6.2.4.7 Hydrological Changes – Surface Waters

Levees will be installed along the Isaac River and Ti-Tree Creek diversion to protect the pits during the operational period up to the 1:1000 year flood event. Post operations the Isaac River levee will be decommissioned and incorporated into the final rehabilitated landforms, and the Ti-Tree Creek levee will be developed into a long term stable final landform.

Sections 4.9 and 4.10 of Chapter 4 describe the Project's potential impacts on hydrology and geomorphology, with a summary provided in Section 4.11.2 as follows:

"The results of the flood modelling show that the impacts of the Project (e.g. levees and Isaac River crossings) on the hydraulic characteristics (such as levels, extents, velocity, bed shear stress and stream power) of the Isaac River are insignificant to minor. The new bridge for the realigned Suttor Developmental Road and the bed level crossing of the Isaac River for the haul road are predicted to have negligible to minor impacts on flood behaviour.

The results for velocity, shear stress and stream power in the Isaac River show insignificant to minor change between existing and developed conditions in the 2% AEP event, with some very minor increases and decreases. On this basis, the Project is not expected to have adverse impacts on the geomorphology of the Isaac River.

For the Ti-Tree Creek diversion, hydraulic parameters are generally within the range of existing (i.e. pre-mining) values and ACARP Guideline values for operational and post-mining conditions. Based on the above geomorphological assessment:

- Velocity, shear stress and stream power values within the diversion generally performed well against ACARP Guideline values.

- Peak modelled velocity, shear stress and stream power values within the diversion were less than the peak modelled values within the existing Ti-Tree Creek.
- Velocity, shear stress and stream power values were greatest within the unnamed Isaac River tributary into which the Ti-Tree Creek diversion flows. However, modelled velocity, shear stress and stream power values within this reach of the tributary are less than those modelled in the existing Ti-Tree Creek.
- Excessive erosion or deposition of sediment within the diversion system is not expected to occur.

Mitigation measures to manage localised erosional risks in Ti-Tree Creek diversion are described in Chapter 4.

Flood hydrographs show that the event duration that produces peak flows in Ti-Tree Creek and the Isaac River is less than 24 hours (i.e. flood events in the region round the Project have a very short duration even for extreme rainfall events). The Project results in negligible changes to flood duration hydrographs (i.e. flood flows are not attenuated or lengthened). Therefore the duration of flooding for developed conditions is similar to existing conditions, which in both cases demonstrates that flood events in the region around the Project have a very short duration for minor to extreme rainfall events.”

Any changes to flood hydrology are not predicted to result in any significant impacts on terrestrial ecology values due to the insignificant to minor changes in flood levels, velocities, duration and extent of inundation. The function of flood regimes is expected to be retained for vegetation and habitat features, including areas of floodplains adjacent to the Isaac River that undergo inundation in periodic flood conditions.

#### **6.2.4.8 Hydrological Changes – Groundwater**

The groundwater dependent ecosystem (GDE) assessment is described in Chapter 5. Multiple lines of evidence were used to assess the groundwater dependence of vegetation. Based on the results of the field survey, it was concluded that riparian vegetation associated with the Isaac River floodplain and alluvium presents the only GDE, being a terrestrial GDE, identified within the survey area.

The GDE assessment concluded that with implementation of a GDE monitoring and management plan (GDEMMP), it is considered that the risk to GDEs posed by Project development, other than the small area (2.2 ha) of direct clearing, ranges from low to insignificant. Any direct clearing of vegetation that is a GDE is described and assessed in this chapter.

#### **6.2.4.9 Erosion and Sedimentation**

Vegetation clearing and land disturbance may result in topsoil exposure and erosion. In addition, disturbance within proximity to the Isaac River, such as the crossings, may also reduce bank stability and increase soil erosion and elevated sediment levels in downstream receiving waters.

The Project has the potential to result in erosion of disturbed areas and sedimentation of waterways through the clearing of vegetation for the development of open-cut pits and the construction of haul roads and other infrastructure.

#### **6.2.4.10 Cumulative Impacts**

Cumulative impacts can be defined as the total impact on the environment that results from the incremental impacts of the action (the Project) added to other past, present and reasonably foreseeable future actions from activities in the region. Cumulative impacts include direct and indirect impacts on the environment.

For ecosystems to be resilient to threats, they need a healthy diversity of individuals, species and populations. The cumulative impact assessment has considered the species present (species diversity,



abundance and dynamics), patterns of species distribution (the communities and ecosystem present that encompass all species), broad habitat types (the ecological niches for the range of species present) and ecosystem processes.

The Project is located within the Brigalow Belt Bioregion and within the Northern Bowen Basin subregion. The Brigalow Belt Bioregion has experienced considerable modification, particularly over the last 70 years due to agriculture and mining. Remnant vegetation cover has been reduced, with communities on the more fertile soils being the most affected. Habitat loss, fragmentation, inappropriate fire regimes, invasive plants and feral animals are relevant threats to the biodiversity values of the bioregion.

Burton Mine and other regional mining projects shown in Figure 3-2 of Chapter 3, have been considered in the assessment of potential cumulative impacts by the Project relevant to the ecological values. Mining activities at Burton Mine located immediately to the east and south have the most potential for cumulative impacts with the Project. Other smaller mines are located between 5 km and 30 km south of Burton Mine. The nearest mining activities to the west are North Goonyella and Red Hill mines, which are approximately 15 km west and separated from the Project by the Burton Range. The nearest mining activity to the east is Hail Creek Mine which is approximately 25 km west and separated from the Project by the Carborough Range.

The Project will result in direct disturbance of 397 ha of vegetation, of which, 342.6 ha is remnant vegetation, and the remaining 54.4 ha is high-value regrowth, adding to the vegetation clearance from other Projects in the region. The remnant and high-value regrowth vegetation to be cleared for the Project provide suitable habitat and connectivity for the threatened species under the EPBC Act identified as potentially impacted by the Project, namely the Koala, the Greater Glider, White-throated Needletail and the Squatter Pigeon. The impacted vegetation represents < 0.4% of the current extent of remnant vegetation in the Northern Bowen Basin subregion, including 1.2% of the remaining RE 11.3.2 within the subregion, associated with the Poplar Box Grassy Woodland on Alluvial Plains TEC.

The cleared agricultural land does not provide habitat for any of the threatened species under the EPBC Act identified as potentially impacted by the Project. All these species rely on wooded vegetation, including the White-throated Needletail, predominantly recorded above wooded areas, and the Squatter Pigeon, which is unlikely to move far from woodland trees which provide protection from predatory birds. Therefore, the impact to cleared agricultural land will not contribute to the cumulative impact in the region.

The Project may impact on biodiversity corridors that provide mobility for fauna species, such as the Koala and the Greater Glider (e.g. the Isaac River). The Project has been designed to avoid and/or minimise impacts to remnant vegetation within the corridors. Impacts within the Isaac River corridor have been limited to two road crossings described above, which are not expected to inhibit species passage. Other regional impacts within biodiversity corridors are limited to three Isaac River crossings at the Red Hill Mine, and the location of North Goonyella Mine at the eastern edge of the Burton Range.

The Project is predicted to have a negligible cumulative impact on surface water and groundwater quality and quantity with a range of management and mitigation measures proposed to be implemented to minimise impacts on surface waters and groundwater (refer to Chapter 4 and Chapter 5). The key ecosystem cycles (e.g. water, nutrients) will remain intact and are not expected to be compromised as a result of cumulative impacts.

‘Loss of Climatic Habitat Caused by Anthropogenic Emissions of Greenhouse Gases’ is listed as a key threatening process under the EPBC Act and consists of reductions in the bioclimatic range within which a given species or ecological community exists due to emissions induced by human activities of greenhouse gases. The likely impacts of climate change on terrestrial flora and fauna are difficult to predict but highlighted as one of the threats to species (e.g. Koala). However, considering the proportional contributions of the Project to direct emissions, and the Project being subject to national legislation on

managing greenhouse gas emissions, the Project is unlikely to significantly alter anthropogenic emissions of greenhouse gases.

The provision of biodiversity offsets in line with Commonwealth policies provide an opportunity to mitigate cumulative impacts on the above mentioned MNES. Offsets for these particular MNES have been required for many of the projects within the region and increase the area of protected habitat that will be managed for conservation. Offsets will also be provided for the Project (refer to Chapter 7) to provide adequate compensation for significant residual impacts on MNES and to yield no net conservation loss.

#### **6.2.4.11 Facilitated Impacts**

Facilitated impacts relate to impacts from other Projects (including by third parties) which are made possible (facilitated) by the Project. Facilitated impacts may be expected to occur through the development of an infrastructure project (e.g. a dam, road or rail line), when that development would enable the development of other projects which otherwise may not have been viable (e.g. the development of a road leads to urban development in an undeveloped area).

The Project will not develop any additional infrastructure that will facilitate the development of any other projects. Rather, the Project will utilise infrastructure already located in the region to minimise its own impacts, such as the Burton Mine CHPP and train load out, and the Goonyella rail line and existing Port for coal export. Mining operations will not facilitate the development of any other projects that could not already be developed. Proposed electrical, rail line, water supply and telecommunications infrastructure will link to existing infrastructure at the Burton Mine and does not facilitate the development of other future projects.

As such, there are not expected to be any facilitated impacts from the Project on any flora or fauna values.

### **6.2.5 Mitigation Measures**

#### **6.2.5.1 Management of Direct Impacts**

##### **6.2.5.1.1 Avoidance**

The Project infrastructure has been sited to avoid or minimise disturbance to remnant vegetation when possible. This includes minimising impacts along the riparian corridor of the Isaac River and avoiding any direct impacts on Hill Creek.

The proposed disturbance area which has informed the vegetation clearing calculations includes areas for construction working room for infrastructure and between different mining areas (see Chapter 3). It is therefore likely to overestimate the direct impact. Opportunities will be sought to avoid clearing in sensitive areas located within the proposed disturbance area, such as the riparian vegetation at the Isaac River crossing locations. Never-the-less, the assessment of impacts has adopted a conservative approach through estimation of a maximum proposed disturbance area.

To minimise impacts on the Isaac River, the proposed disturbance area is generally greater than 50 m from the Isaac River high bank, with some localised areas approximately 30 m distant.

##### **6.2.5.1.2 Vegetation clearance protocols**

The following management measures will be implemented in areas of proposed vegetation clearance:

- Clearing activities will be undertaken progressively in accordance with the mine schedule and Project requirements.
- Vegetation/habitat adjoining proposed clearance areas will be delineated and clearly marked to prevent accidental damage through a 'permit to disturb' process.
- Areas to be cleared will be inspected to identify fauna at direct risk from clearing activities, and an appropriately qualified fauna spotter/catcher will be present during clearing.



- Broadscale vegetation clearing is to be undertaken towards retained vegetation to prevent isolation and allow movements of fauna.
- Fauna spotter/catcher will monitor clearance activities for the listed threatened species, and any incidence of fauna mortality or injury will be recorded. Injured fauna will be taken to a wildlife carer or veterinarian.
- Trees bordering vegetation that will not be cleared will be felled in the direction of the clearance zone to avoid impacts to adjoining retained vegetation and habitat.
- Clearing operations will be managed to maximise the reuse of cleared vegetative material. This will include the salvage and reuse of select habitat resources from the cleared vegetation (e.g. logs) for habitat enhancement either in the rehabilitation program or elsewhere on site.

#### 6.2.5.1.3 Rehabilitation

Land disturbed by mining activities will be rehabilitated progressively as it becomes available. Details of the proposed rehabilitation program are provided in the progressive rehabilitation and closure plan (PRCP) schedule prepared for the Project, as approved by the State DES (**Appendix 5**). In accordance with the Queensland government's policy objectives defined in the 'Mined land rehabilitation policy', the general rehabilitation goals for the Project are to leave an area that is safe and stable, does not cause environmental harm and is able to sustain the post-mining land use approved in the PRCP schedule.

#### 6.2.5.2 MNES Species Impact Management Plan

A MNES Species Impact Management Plan (SIMP) is provided in **Appendix 23**. The SIMP has been developed to manage impacts to the TECs and listed threatened species identified as likely to be significantly impacted by the Project, as described in Section 6.2.6.

The SIMP utilises information developed in the Terrestrial Ecology Impact Assessment Report **Appendix 12** to describe the existing environment, relevant MNES, relevant statutory plans and guidelines informing management actions and potential impacts and threats to MNES.

Section 6 and Section 7 of the SIMP (**Appendix 23**) describes management measures that follow the S.M.A.R.T principle through the provision of:

- environmental objectives
- specific, achievable management actions relevant to the identified MNES
- timing and frequency of management actions
- responsible parties
- measurable success criteria
- corrective actions
- monitoring, reporting and adaptive management.

Management actions are described for all Project phases; pre-construction, construction, operations and rehabilitation and closure.

Furthermore, habitat quality and species monitoring have been developed for the Poplar Box TEC, Greater Glider, Koala and Squatter Pigeon that specify:

- objectives
- specific, achievable monitoring actions
- timing and frequency of monitoring actions
- responsible parties
- measurable success criteria
- corrective actions
- monitoring, reporting and adaptive management.

### 6.2.5.3 State Species Management Program

Under the *Nature Conservation Act 1992* (NC Act) a Species Management Program must be approved when interfering with native fauna habitat and breeding places. Applications for high risk and low risk Species Management Programs will be made prior to Project activities commencing.

A 'low risk' Species Management Program applies when tampering with any native animal breeding place, including least concern species. Least concern species have been identified at the Project. A 'high risk' Species Management Program applies when tampering with threatened species, special least concern species and colonial breeders. This includes the Koala, Greater Glider, and Squatter Pigeon.

### 6.2.5.4 Habitat Fragmentation

The avoidance, mitigation and management measures that have been described for direct vegetation clearance/habitat disturbance, are also relevant to minimising habitat fragmentation and impacts on connectivity. Nonetheless, additional mitigation measures, such as the ones recommended in Koala-sensitive Design Guideline (DES 2022), will be adopted to minimise the impact to habitat connectivity:

- The width of the crossings and disturbance buffer will be reduced to the minimum required for safe construction working room.
- Rehabilitation of the construction corridor will occur when disturbance occurs beyond the infrastructure area
- Species management measures, as part of a Species Management Program, will be implemented for species of conservation significance (i.e. Koala and Greater Glider) to:
  - assist in the planning for the construction; and
  - monitor the species during and after the construction process.

The bed level haul road crossing does not constitute a barrier for small dwelling fauna.

With the proposed management measures it is considered unlikely that the Project will result in habitat fragmentation beyond the assessed direct impacts.

### 6.2.5.5 Weeds and Pests

A Weed and Pest Management Plan has been prepared for the Project and is provided as **Appendix 24**. The Weed and Pest Management Plan considers relevant Commonwealth, State and local regulatory frameworks, and provides management measures for weeds and pests identified through ecological assessments for the Project.

Section 4 of the Weed and Pest Management Plan describes:

- the strategy for weed and pest management
- hierarchy for effective weed and pest management
- specific and measurable management actions
- timing and frequency of management actions
- responsible persons
- measurable success criteria
- corrective actions
- monitoring, reporting and adaptive management.

The Weed and Pest Management Plan includes:

- inspections within the mining leases to identify areas requiring weed management to be implemented
- weed management measures (e.g. mechanical removal and application of approved herbicides) based on weed control strategies outlined by the Department of Agriculture and Fisheries and the 'Isaac Regional Biosecurity Plan 2024–2027'



- requirements for maintenance of a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation of these areas by introduced fauna
- requirements for storage of domestic waste in appropriate receptacles and locations
- monitoring and managing pest animal populations
- feral animal control strategies based on pest control strategies outlined by the Department of Agriculture and Fisheries, 'Isaac Regional Biosecurity Plan 2024–2027' and Threat Abatement Plans applicable to the EPBC Act listed key threatening processes
- coordination of pest management program with surrounding stakeholders.

With the implementation of the Weed and Pest Management Plan, it is considered unlikely that the Project will significantly increase the occurrence or diversity of weeds or feral pests with the proposed management measures.

#### **6.2.5.6 Noise, Vibration, Dust and Lighting**

Noise and vibration management will be undertaken to achieve compliance with the noise and vibration limits specified in the EA.

An air quality impact assessment was undertaken for the Project as part of the Queensland EA approval process, and predictions of dust deposition rates comply with the condition limits at all sensitive receptors. Notwithstanding, dust control measures will be employed, including personnel and contractors will be required to observe speed limits when driving on access roads within mining areas and surrounds to minimise the generation of dust, watering of potential dust generating surfaces, and progressive rehabilitation of disturbance areas (such as overburden dumps) to minimise dust emissions.

The exterior lighting will be designed to provide a safe working environment. Australian Standard AS/NZS 4282:2019 'Control of the obtrusive effects of outdoor lighting' recognises the impact of artificial light on biota. To minimise potential impacts of artificial lighting, the placement, configuration and direction of lighting for the Project will be implemented in consideration of AS 4282:2019 'Control of the obtrusive effects of outdoor lighting' (Standards Australia 2019).

With the proposed management measures, it is unlikely that the health and viability of surrounding vegetation and local fauna will be significantly impacted by dust, vibration, noise and lighting.

#### **6.2.5.7 Vehicle Strike**

Contributing risk factors for vehicle strike are the speed of vehicles on roads and tracks, and limiting speed can reduce the threat of vehicle strike to fauna species such as Koala. Speed limits will be imposed on Project roads and tracks to reduce the risk of vehicle strike on native fauna. The public road realignment will not change the frequency of public traffic compared to the existing road and Isaac River crossing, with speed limits expected to be the same as the current public road. The bed level crossing for mine haul trucks will be subject to speed controls (e.g. maximum speed limit of 40 km/h), which will reduce the potential for vehicle strike. Safe driving procedures will also be incorporated into site inductions to increase awareness of the risk of vehicle strike.

#### **6.2.5.8 Hydrological Changes**

As described in Sections 6.2.4.7 and 6.2.4.8, vegetation is not predicted to be impacted by changes in the hydrology of surface water or groundwater. Therefore additional mitigation measures, beyond those described Chapter 4 and Chapter 5 for surface water and groundwater, are not proposed.

#### **6.2.5.9 Erosion and Sedimentation**

Vegetation clearance protocols, as described in Section 6.2.5.1, and erosion and sediment control measures, as described in Chapter 4 (Section 4.12), will be implemented to minimise potential impacts.

#### 6.2.5.10 Bushfire

While plants and animals have a range of mechanisms to survive individual fires, accidental bushfires could potentially occur if mine activities are not appropriately managed.

Bushfire prevention and management measures will be implemented for the Project, and fire awareness will be included in the induction of personnel and contractors to minimise the risk of bushfire, with this also being a critical health and safety requirement for mining activities. Given the implementation of management measures, the Project is unlikely to increase the bushfire potential within the surrounding landscape.

### 6.2.6 Assessment of Significance of Impacts

The listed threatened TECs and species that have been identified as known, likely or potentially occurring (see Section 6.2.3.9) have been assessed against the relevant criteria in the ‘Significant Impact Guidelines 1.1: Matters of National Environmental Significance’ (DoE 2013). This assessment considers the potential direct and indirect impacts of the Project on the TEC or species, as well as the management measures proposed to mitigate impacts.

#### 6.2.6.1 Poplar Box Grassy Woodland on Alluvial Plains TEC

##### 6.2.6.1.1 TEC Impact Assessment

The Project will directly disturb five patches of Poplar Box Grassy Woodland on Alluvial Plains TEC totalling 112.2 ha (see Figure 6-13). To ensure all Poplar Box Grassy Woodland on Alluvial Plains TEC remain viable post Project impact, residual patches whose extent is reduced to below 5 ha as result of the Project, have been considered impacted.

The remaining patches will be viable (>5 ha) and will retain existing connectivity. Vegetation management controls and clearing protocols will be implemented to prevent accidental damage to the remaining vegetation (e.g. a ‘Permit to Disturb’ process), as indicated in Section 6.2.5.1.

The vegetation clearing may increase the edge effects on affected TEC patches. It is not expected to generate conditions likely to cause additional weed incursion in the remaining TEC, and the monitoring and maintenance of weeds in accordance with the site Weed and Pest Management Plan will be implemented (Section 6.2.5.5).

Potential hydrological changes that might affect the Poplar Box Grassy Woodland on Alluvial Plains TEC are groundwater drawdown (impacting GDEs) and potential flooding. Based on the GDE Assessment (**Appendix 10**) riparian vegetation associated with the Isaac River floodplain and alluvium (Terrestrial GDEs (TGDEs)) presents the only GDEs identified within the survey area corresponding to VC1 (RE 11.3.25) within the Isaac River. Groundwater drawdown is unlikely to affect the Poplar Box Grassy Woodland on Alluvial Plains TEC, and with implementation of the GDEMMP (refer to Chapter 5), it is considered that the risk to GDEs posed by drawdown from Project development, ranges from low to insignificant. Likewise, based on the flooding models prepared for the Project, (Section 6.2.5.8) it is not predicted that changes in flood behaviour will impact the vegetation within and adjacent the Project disturbance area.

Indirect impacts associated with dust and bushfire risk are considered unlikely given the management measures to be implemented (e.g. including fire awareness in inductions for personnel and contractors) (Section 6.2.5).

##### 6.2.6.1.2 TEC Mitigation Measures

The Project has been designed to avoid and mitigate impacts to the Poplar Box Grassy Woodland on Alluvial Plains TEC where practicable. A description of proposed management measures is provided in



Section 6.2.5. The proposed avoidance and mitigation measures for the Poplar Box Grassy Woodland on Alluvial Plains TEC, including timing, predicted effectiveness, monitoring, adaptive management and the relevant statutory or policy basis, is provided in Table 6-12.

The following conservation, recovery and threat abatement plans relevant to the Poplar Box Grassy Woodland on Alluvial Plains TEC have been considered in the assessment of the TEC, the development of avoidance, mitigation and management measures and/or assessment of significant impact for the TEC:

- The ‘Approved Conservation Advice for Poplar Box Grassy Woodland on Alluvial Plains’ (DoEE, 2019), developed at the time of EPBC Act listing outlines the key diagnostic criteria and condition thresholds for the TEC and the priority conservation actions for the community. The conservation advice also describes areas considered critical to the survival of the community.

The ‘Poplar Box Grassy Woodland on Alluvial Plains’ ecological community SPRAT profile provides information about the indicative distribution of the Poplar Box Grassy Woodland on Alluvial Plains TEC. The SPRAT profile for this TEC indicates there is no adopted or made Recovery Plan, as the listing and the implementation of actions in the Approved Conservation Advice provides sufficient protection and guidance on the recovery of the TEC.

No Threat Abatement Plan has been identified as being relevant the Poplar Box Grassy Woodland on Alluvial Plains TEC.

**Table 6-12      Poplar Box Grassy Woodland on Alluvial Plains TEC Impact Avoidance and Mitigation Measures**

| Avoidance/mitigation measures                                                                                                                      | Timing                  | Predicted effectiveness                                                             | Monitoring and adaptive management                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Statutory or policy basis |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Implement vegetation clearance protocols, including the delineation of vegetation adjoining proposed clearance areas to prevent accidental damage. | Construction/operations | Highly effective management technique to manage vegetation clearance activities.    | Monitor disturbance/vegetation clearance areas against approved disturbance limits in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ).<br><br>Should clearing exceed approved limits, incident reporting would be initiated, with a corrective action plan to be proposed (including proposed timing) and implemented in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). The corrective actions will be informed by the nature and extent of the exceedance. | DoEE (2019)               |
| Limit activities that cause disturbance to minimise occurrence and spread of weeds.                                                                | Construction/operations | Highly effective management technique to manage the spread and occurrence of weeds. | Monitor disturbance/vegetation clearance areas against approved disturbance limits.                                                                                                                                                                                                                                                                                                                                                                                                                                         | DoEE (2019)               |

| Avoidance/mitigation measures                                                                                                                                                                                                                                                                                                                                                                           | Timing                                                     | Predicted effectiveness                                                             | Monitoring and adaptive management                                                                                                                                                                                                                                                                                                                                                 | Statutory or policy basis                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <p>Regularly inspect mine-related surface disturbance areas to identify areas requiring weed management measures to be implemented in accordance with the Weed and Pest Management Plan (<b>Appendix 24</b>).</p> <p>Implement weed management measures in accordance with the Weed and Pest Management Plan (<b>Appendix 24</b>) (e.g. mechanical removal and application of approved herbicides).</p> | Construction/operations/rehabilitation and decommissioning | Effective management measure to manage the spread and occurrence of weeds.          | <p>Monitor and manage weeds in accordance with the Weed and Pest Management Plan.</p> <p>Corrective actions (such as increasing the frequency or extent of control efforts, or alternative control strategies) will be implemented, as necessary in accordance with the Weed and Pest Management Plan (<b>Appendix 24</b>).</p>                                                    | DoEE (2019), Commonwealth of Australia (2017a), DAF (2023), Isaac Regional Council (2024) |
| Maintain a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation of these areas by introduced fauna.                                                                                                                                                                                                                                                       | Construction/operations/rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests. | <p>Regular monitoring of the site will be carried out by environmental personnel.</p> <p>Raise awareness through personnel inductions. Additional measures (such as tool box talks or staff newsletters) will be implemented if inspections indicate a clean, rubbish-free environment is not being maintained.</p>                                                                | DoEE (2019), Commonwealth of Australia (2017b), DoEE (2017)                               |
| Store domestic waste in appropriate receptacles and locations.                                                                                                                                                                                                                                                                                                                                          | Construction/operations/rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests. | <p>Regular monitoring of site will be carried out by environmental personnel. Waste generation monitoring and audit will be in accordance with the site's waste management procedures.</p> <p>Additional measures (such as provision of additional receptacles or change in location of receptacles) will be implemented if current storage practices encourage feral animals.</p> | DoEE (2019), Commonwealth of Australia (2017b)                                            |

| Avoidance/mitigation measures                                                                                                                                                                     | Timing                                                       | Predicted effectiveness                                                                             | Monitoring and adaptive management                                                                                                                                                                                                                                                                                                           | Statutory or policy basis                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Implement pest control measures in accordance with the Weed and Pest Management where infestations develop.                                                                                       | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests.                 | Monitor and manage pests in accordance with the Weed and Pest Management Plan (Section 6.2.5.5).<br><br>Corrective actions (such as increasing the frequency or extent of control efforts, or alternative control strategies) will be implemented, as necessary in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ). | DoEE (2019), Commonwealth of Australia (2017b), DAF (2023), Isaac Regional Council (2024), DoEE (2016), DoEE (2017) |
| Coordinate pest management program in consideration of surrounding stakeholders.                                                                                                                  | Construction/ operations/ rehabilitation and decommissioning | Coordinated activities are predicted to achieve better regional outcomes for weed and pest species. | Incorporate consultation outcomes into management measures, with the management measures will be implemented on -site in accordance with the Weed and Pest Management Plan (Section 6.2.5.5).                                                                                                                                                | DoEE (2019), Commonwealth of Australia (2017a), Commonwealth of Australia (2017b), Isaac Regional Council (2024)    |
| Bushfire prevention and management measures will be outlined in the Emergency Response Plan to be prepared for the Project.<br><br>Inductions of mine site personnel will include fire awareness. | Construction/ operations/ rehabilitation and decommissioning | Effective management procedure to reduce the risk of bushfire.                                      | Any incidence of bushfire will be investigated to determine the requirement for additional controls. Potential adaptive management measures include revision of the Emergency Response Plan and/or a program to increase personnel awareness of bushfire risk (e.g. through tool box talks)                                                  | DoEE (2019)                                                                                                         |

### 6.2.6.1.3 Residual Significant Impact Assessment

Table 6-13 provides an assessment of the likelihood of significant impacts on the Poplar Box Grassy Woodland on Alluvial Plains TEC in accordance with the Commonwealth ‘Significant Impact Guidelines 1.1: Matters of National Environmental Significance’ (DoE 2013), with the significant impact areas shown in Figure 6-13.

**Table 6-13 Poplar Box Grassy Woodland on Alluvial Plains TEC Significant Impact Assessment**

| Significance criteria                                                                                                                                                 | Assessment of significance                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| An action is likely to have a significant impact on a Critically Endangered or Endangered ecological community if there is a real chance or possibility that it will: |                                                                                                              |
| Reduce the extent of an ecological community                                                                                                                          | The Project will result in direct clearing of 112.2 ha of Poplar Box Grassy Woodland on Alluvial Plains TEC. |

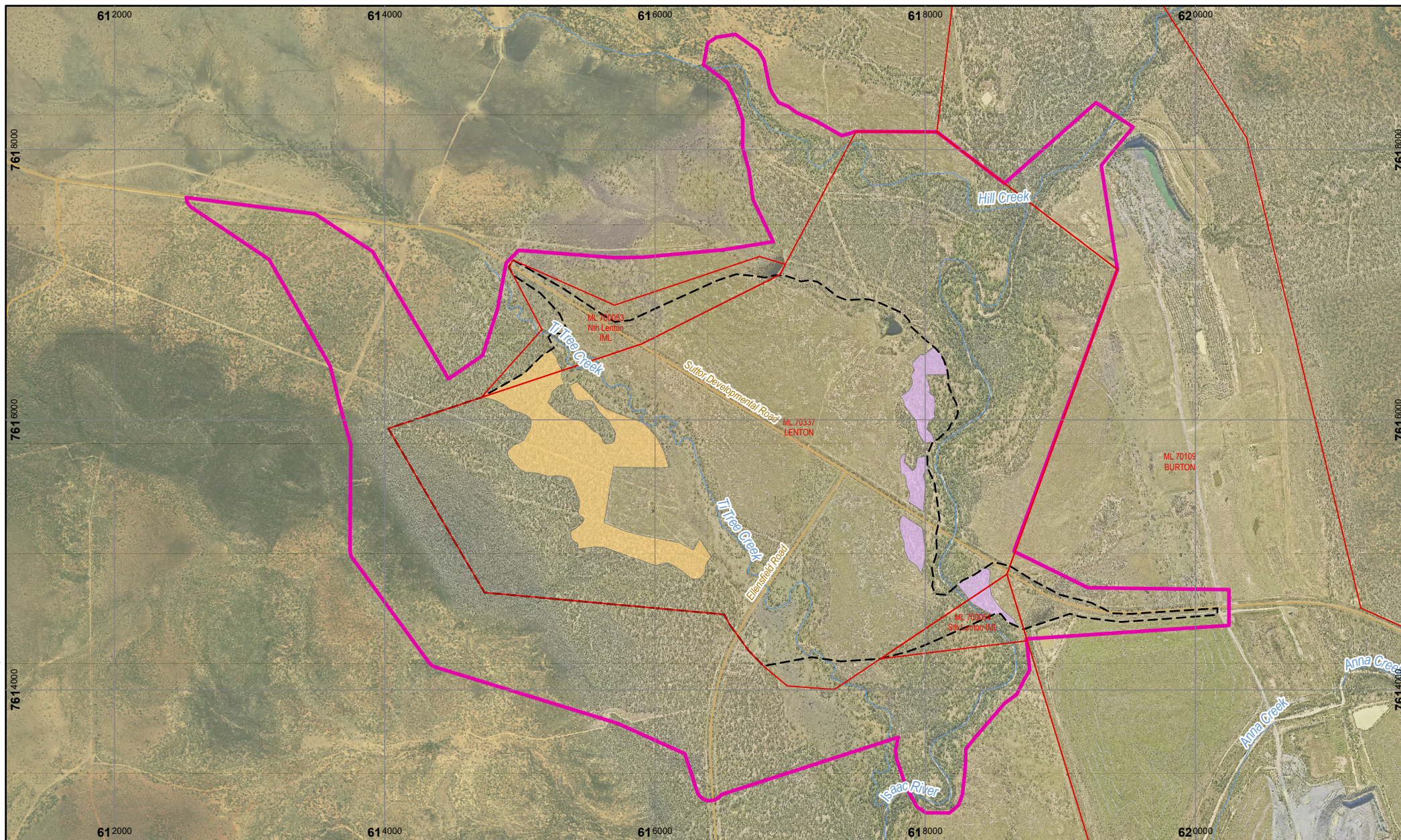


| Significance criteria                                                                                                                                                                                                                       | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fragment or increase fragmentation of an ecological community                                                                                                                                                                               | <p>The Poplar Box Grassy Woodland on Alluvial Plains TEC vegetation in the survey area has been subject to past disturbance related to grazing land use.</p> <p>Two patches of Poplar Box Grassy Woodland on Alluvial Plains TEC will be only partially impacted, and three patches will be wholly impacted. However, the remaining patches are expected to remain viable post the mining impact (patch size above 5 ha) and will retain connectivity with the remnant vegetation within the survey area.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Adversely affect habitat critical to the survival of an ecological community                                                                                                                                                                | <p>Habitat critical to the survival of the Poplar Box Grassy Woodland on Alluvial Plains TEC is 'Class A, High quality'. One patch of Poplar Box Grassy Woodland on Alluvial Plains TEC within the proposed disturbance area has been identified as Category A2 (within 'Class A Good quality') and, therefore, may be considered habitat critical to the survival of the TEC. This patch will be partially cleared, resulting in the disturbance of 83.1 ha.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels or substantial alteration of surface water drainage patterns | <p>Management measures will be applied to prevent erosion and sedimentation resulting from Project activities within the Poplar Box Grassy Woodland on Alluvial Plains TEC habitat. Given these controls, the Project is not predicted to cause erosion-related impacts that will modify or destroy factors necessary for the survival of the Poplar Box Grassy Woodland on Alluvial Plains TEC.</p> <p>The Poplar Box Grassy Woodland on Alluvial Plains TEC in the survey area has not been identified as a GDE (see Chapter 5), and therefore changes to groundwater levels are unlikely to affect the TEC's survival. Further monitoring of GDE presence and health, including groundwater usage by the TECs, and proposed corrective actions will be completed as part of the GDEMMP (<b>Appendix 19</b>) and GDE habitat quality monitoring program (<b>Appendix 20</b>).</p> <p>As detailed in Section 6.2.4.7, modifications to flood behaviour change will result in negligible impacts to the Poplar Box Grassy Woodland on Alluvial Plains TEC.</p>                                                                                                                                                                                             |
| Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species                                                                    | <p>Two Poplar Box Grassy Woodland on Alluvial Plains TEC patches will be partially impacted by the Project. The partial impact on these patches may create potential for edge effects on these patches.</p> <p>Edge effects to remaining areas of this TEC are unlikely to be significant, as the TEC is already subject to established introduced ground cover species and weed species listed as restricted matters under the <i>Biosecurity Act</i> (Queensland) and/or as WoNS.</p> <p>Weed control measures will be implemented throughout the survey area in accordance with the Weed and Pest Management Plan (<b>Appendix 24</b>) to minimise the risk of degradation of Poplar Box Grassy Woodland on Alluvial Plains TEC through change in species composition. The result of the implementation of the mitigation measures proposed in this assessment will be that it is unlikely the retained TEC in the survey area will experience a decline or loss of the functionally important species.</p> <p>Bushfire prevention and management measures will be implemented in accordance with the site Emergency Response Plan, which will protect the functionally important species of the Poplar Box Grassy Woodland on Alluvial Plains TEC.</p> |

| Significance criteria                                                                                                                                                                                                                                                                                                                                                                                                                                               | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:</p> <p>assisting invasive species that are harmful to the listed ecological community to become established, or</p> <p>causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community, which kill or inhibit the growth of species in the ecological community</p> | <p>Two Poplar Box Grassy Woodland on Alluvial Plains TEC patches will be partially impacted by the Project. The remaining areas of the impacted patches may be subject to edge effects; however, the Project disturbance area is within a modified rural landscape where introduced species have been recorded throughout the TEC. The proposed Project is unlikely to increase the threat of invasive species in the landscape.</p> <p>The Project is unlikely to result in the mobilisation of pollutants into this TEC either within or adjacent to the Project disturbance area.</p> <p>The Project is not likely to use fertilisers on-site or cause regular mobilisation of herbicides that may impact the Poplar Box Grassy Woodland on Alluvial Plains TEC. Control measures such as sediment dams will be in place to minimise the potential for pollutants to affect the Poplar Box Grassy Woodland on Alluvial Plains TEC in the survey area.</p> |
| Interfere with the recovery of an ecological community                                                                                                                                                                                                                                                                                                                                                                                                              | <p>There is no national recovery plan for the Poplar Box Grassy Woodland on Alluvial Plains TEC.</p> <p>The Project will result in the reduction of extent of the Poplar Box Grassy Woodland on Alluvial Plains TEC by approximately 112.2 ha.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Conclusion</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>The Project is considered to have a significant impact on 112.2 ha of the Poplar Box Grassy Woodland on Alluvial Plains TEC. The extent of these impacts is shown in Figure 6-13.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



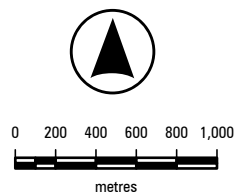
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|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <span style="border: 1px solid red; display: inline-block; width: 20px; height: 10px;"></span> Mining Lease           | <span style="color: orange;">—</span> Roads                                                                                               |
| <span style="border-top: 1px dashed black; display: inline-block; width: 20px;"></span> Proposed Disturbance Boundary | <span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Poplar Box TEC |
| <span style="border: 2px solid magenta; display: inline-block; width: 20px; height: 10px;"></span> Survey Area        | <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Category A2    |
| <span style="color: blue;">—</span> Waterway                                                                          | <span style="background-color: purple; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Category C     |

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Poplar Box Grassy Woodland on  
 Alluvial Plains Significant Impact Area



## 6.2.6.2 Greater Glider

### 6.2.6.2.1 Species Impact Assessment

A total of 293 ha of Greater Glider habitat is proposed to be directly disturbed through clearing for the Project, comprising 203.3 ha of preferred habitat and 89.7 ha of suitable habitat (see Figure 6-14).

Greater Glider habitat mostly occurs within riparian vegetation adjacent to Isaac River, Hill Creek and on the floodplain to the west of Ti-Tree Creek. The riparian vegetation along the Isaac River and Hill Creek will be mostly retained, and it will be only impacted by the Isaac River crossings. Potential fragmentation of the Isaac River fauna corridor will be minimised by the implementation of the measures listed in Section 6.2.4.3.

The risk of changes in flood behaviour impacting vegetation is negligible (Section 6.2.5.8). One the vegetation communities along the Isaac River, V4 (RE 11.3.25), has been identified as GDE. Based on the GDE report (Appendix 10), with implementation of the GDEMMP (**Appendix 19**), it is considered that the risk to GDEs posed by drawdown from Project development, ranges from low to insignificant. Therefore, changes in hydrology and groundwater are considered unlikely to impact the species habitat.

The potential for other indirect impacts to the Greater Glider from noise and vibration, dust, erosion and sedimentation, lighting and vehicle strike is considered to be minimal given the measures that will be implemented to manage these impacts (Section 6.2.5). Weed and pest management measures will be implemented for the Project in accordance with the site Weed and Pest Management Plan (**Appendix 24**), reducing the risk of an increase in weed and animal pest populations.

### 6.2.6.2.2 Species Mitigation Measures

A description of proposed management measures is provided in Section 6.2.5. The proposed avoidance and mitigation measures for Greater Glider, including timing, predicted effectiveness, monitoring, adaptive management and the relevant statutory or policy basis, is provided in Table 6-14.

The following conservation information relevant to the Greater Glider has been considered in this assessment:

- The ‘Conservation Advice for *Petauroides volans* (Greater Glider (southern and central))’ (DCCEEW 2022) outlines the reasons for the conservation assessment of the species with regard to the 2022 uplisting of the species and provides information about the Greater Glider, including information in relation to its distribution, biology/ecology, threats and conservation and management actions.

The ‘*Petauroides volans*–Greater Glider’ SPRAT profile provides information about the relevant regulatory considerations and links to information available in relation to its listing under the EPBC Act. The SPRAT profile indicates there is no adopted or made Recovery Plan for this species; however, a Recovery Plan is required.

**Table 6-14 Greater Glider Impact Avoidance and Mitigation Measures**

| Avoidance/mitigation measures                                                                     | Timing                                | Predicted effectiveness                                                     | Monitoring and adaptive management                                                                                                                                    | Statutory or policy basis |
|---------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Project infrastructure has been located to minimise direct disturbance to Greater Glider habitat. | Mine planning/construction/operations | Highly effective—minimises the extent of impacts to Greater Glider habitat. | Monitor disturbance/vegetation clearance areas against approved disturbance limits in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). | DCCEEW (2022)             |

|                                                                                                                                                                                                                                                                                                                         |                                                              |                                                                                     |                                                                                                                                                                                                                                                                                                                          |                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Implement vegetation clearance protocols, including the delineation of vegetation adjoining proposed clearance areas to prevent accidental damage.                                                                                                                                                                      | Construction/ operations                                     | Highly effective management technique to manage vegetation clearance activities.    | Should clearing exceed approved limits, incident reporting would be initiated with a corrective action plan will be proposed (including proposed timing) and implemented MNES Species Impact Management Plan ( <b>Appendix 23</b> ). The corrective actions will be informed by the nature and extent of the exceedance. |                                                                                                                |
| Coordinate pest management program in consideration of surrounding stakeholders.                                                                                                                                                                                                                                        | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests. | Monitor and manage pests in accordance with the Weed and Pest Management Plan (Section 6.2.5.5) to be implemented for the Project.                                                                                                                                                                                       | DCCEEW (2022), Commonwealth of Australia (2017b), DAF (2023), Isaac Regional Council (2024)                    |
| Fauna spotter/ catcher will be on -site when clearing activities occur within Greater Glider habitat. Fauna spotter/catcher will monitor clearance activities for the Greater Glider, and any incidence of fauna mortality or injury will be recorded. Injured fauna will be taken to a wildlife carer or veterinarian. | Construction/ operations                                     | Potentially effective.                                                              | Adaptive measures will be implemented MNES Species Impact Management Plan ( <b>Appendix 23</b> ), as necessary. Potential adaptive measures will include pre-clearance surveys and progressive clearing around known habitat trees.                                                                                      | DCCEEW (2022)                                                                                                  |
| Minimise effects of artificial lighting.                                                                                                                                                                                                                                                                                | Mine planning/ construction                                  | Effective management measure to minimise effects of artificial lighting.            | Mine planning for MIA will include lighting designs (placement, configuration and direction) to minimise light spill.                                                                                                                                                                                                    | DAWE (2020), AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting' (Standards Australia 2019) |
| Bushfire prevention and management measures will be outlined in the Emergency Response Plan. Inductions of mine site personnel will include fire awareness.                                                                                                                                                             | Construction/ operations/ rehabilitation and decommissioning | Effective management procedure to reduce the risk of bushfire.                      | Any incidence of bushfire will be investigated to determine the requirement for additional controls. Potential adaptive management measures include revision of the Emergency Response Plan and/or a program to increase personnel awareness of bushfire risk (e.g. through tool box talks).                             | DCCEEW (2022)                                                                                                  |

### 6.2.6.2.3 Residual Significant Impact Assessment

Table 6-15 provides an assessment of the likelihood of significant impacts on the Greater Glider in accordance with the Commonwealth ‘Significant Impact Guidelines 1.1: Matters of National Environmental Significance’ (DoE 2013), with the significant impact areas shown in Figure 6-14.

Considering the species’ most recent conservation advice (DCCEEW 2022), which states that all populations are important populations given its Endangered status, the Greater Glider has been assessed as important population for the purpose of the significant impact assessment.

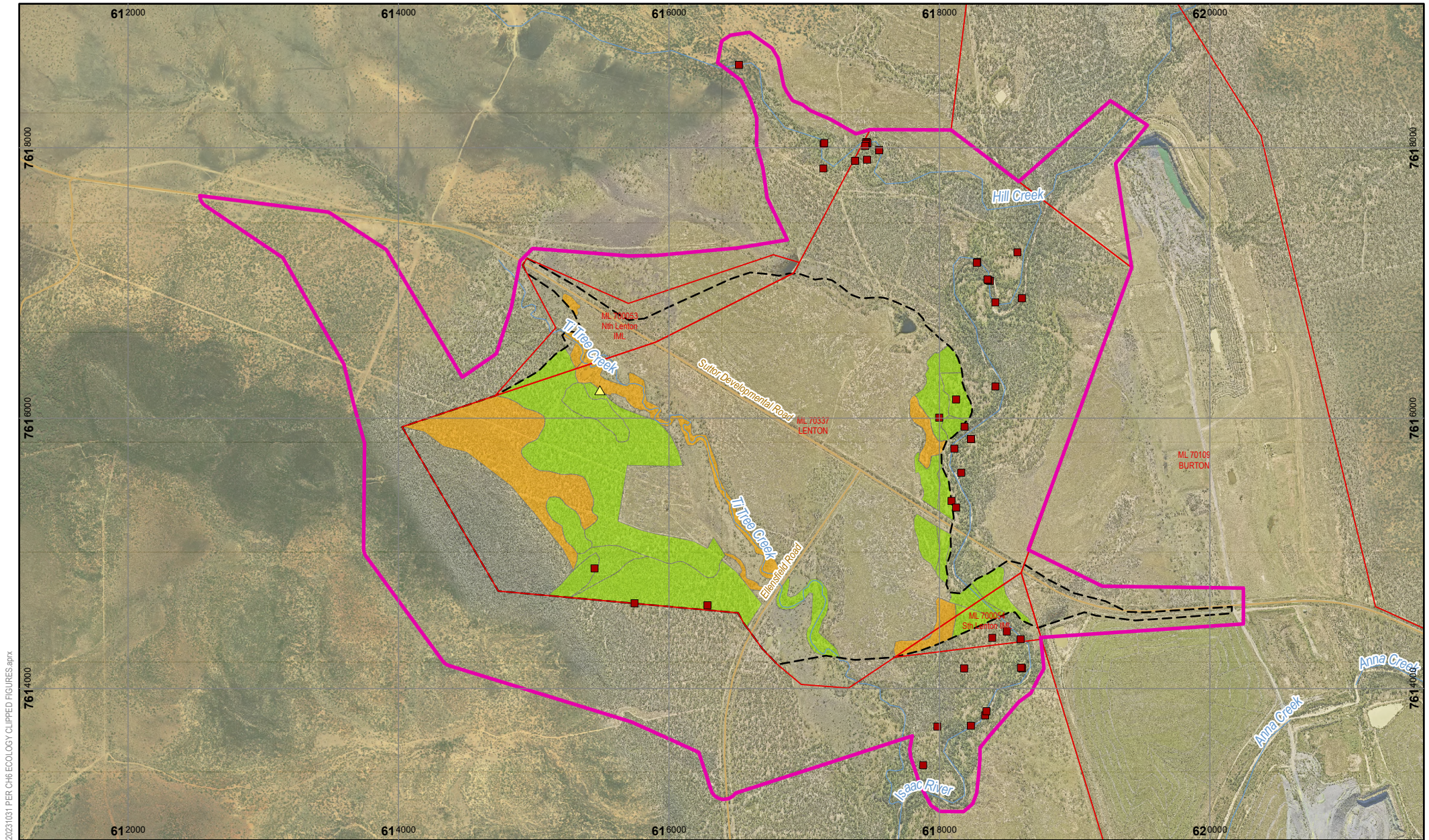
**Table 6-15 Greater Glider Significant Impact Assessment**

| Significance criteria                                                                                                           | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Lead to a long-term decrease in the size of an important population of a species                                                | The impacts to all Greater Glider habitat include the removal of 293 ha of habitat. However, it is unlikely that this disturbance will lead to a long-term decrease in size of an important population as the connectivity within the Isaac River and Hill Creek riparian corridors, where the species has been mostly recorded (Figure 6-8) will be retained.                                                                                                                                                                                                                                                                 |
| Reduce the area of occupancy of an important population                                                                         | The Greater Glider has been observed to favour the riparian vegetation along the Isaac River and Hill Creek, with occasional observations within the surrounding dry Eucalypt woodlands in the surrounding area, particularly in floodplains.<br><br>Given the abundance of species records within the survey area, the clearing on 293 ha of dry Eucalypt woodland, which form preferred and suitable habitat for the species, will likely reduce the area of occupancy of the local important population.                                                                                                                    |
| Fragment an existing important population into two or more populations                                                          | The riparian vegetation will be mostly retained, only impacted by the construction of the Isaac River crossings. Considering the mitigation measures proposed for the river crossings, it is unlikely the new infrastructure will prevent the movement of the species, and therefore the Project is unlikely to fragment a population into two or more populations.                                                                                                                                                                                                                                                            |
| Adversely affect habitat critical to the survival of a species                                                                  | There is currently no habitat for the Greater Glider listed on the Register of Critical Habitat. However, according to the latest approved conservation advice, all preferred habitat identified within the survey area is considered habitat critical to the survival of the species due to being a large contiguous area of eucalypt forest with mature hollow-bearing trees and a variety of forage species in the canopy.<br><br>As such, impacts on 203.3 ha of preferred habitat for the Greater Glider within the survey area is considered likely to adversely affect habitat critical to the survival of the species. |
| Disrupt the breeding cycle of an important population                                                                           | The Greater Glider has been observed to favour the riparian vegetation along the Isaac River and Hill Creek (Figure 6-8), with only occasional records within the surrounding dry Eucalypt woodlands. This observation coincides with the presence of hollow-bearing trees, required by the species for nesting.<br><br>The riparian corridors will be mostly retained, and will only be impacted by the construction of Isaac River crossings. This disturbance, undertaken with proposed management measures, is unlikely to disrupt the breeding cycle of an important population.                                          |



| Significance criteria                                                                                                                   | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | <p>The impacts to all Greater Glider habitat include the removal of 293 ha of preferred and suitable habitat.</p> <p>The removal of this extent of habitat is unlikely to lead to a long-term decline in the species population given the wide extent of habitat for this species. The survey area is connected to areas of remnant vegetation habitat to the north-east and north-west boundaries and along the riparian vegetation at the Isaac River and Hill Creek, which represents areas of habitat to support mobility for the species throughout the broader region.</p> <p>The retained habitat throughout the survey area is unlikely to be indirectly impacted by the Project. Indirect impacts, such as weeds and pests, noise and vibration, dust, artificial lighting, vehicle strike and bushfire, will be managed as outlined in Section 6.2.5 and are considered not to have potential to impact the availability or quality of habitat to the extent that the Greater Glider is likely to decline. Similarly, as indicated in Section 6.2.4.7, flood behaviour change will result in negligible impacts to the availability or quality of the species habitat.</p> <p>Based on the GDE assessment (see Chapter 5), the risk to the GDE identified within the survey area (which forms a portion of Greater Glider habitat in the survey area) will be low to insignificant and therefore groundwater drawdown is unlikely to impact on the availability or quality of habitat to the extent that the Greater Glider is likely to decline.</p> |
| Result in invasive species that are harmful to a Vulnerable species becoming established in the Vulnerable species habitat              | <p>The survey area is in a modified rural landscape, and invasive species exist in the broader region. Invasive species (Feral Cats and Red Foxes) and native species (owls and Sulphur Crested Cockatoos) are recognised as a threat to the Greater Glider. Feral Cat was recorded in surveys. Given the proposed monitoring and management of pests including corrective actions in accordance with the Weed and Pest Management Plan (<b>Appendix 24</b>), the Project is unlikely to result in the increase of invasive species likely to be harmful to the Greater Glider.</p> <p>The confidence in the threat posed by native species threats is considered low and these threats are considered applicable for small parts of the Greater Glider range. The numbers of native owls or Sulphur-crested Cockatoos are considered unlikely to be a threat to the Greater Glider in the survey area and the Project is unlikely to alter these threats.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Introduce disease that may cause the species to decline                                                                                 | <p>There are no diseases of the Greater Glider listed as a threat to the species (DCCEEW 2022).</p> <p>The Project is unlikely to introduce a disease that may cause the species to decline.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Interfere substantially with the recovery of the species                                                                                | <p>There is no adopted or made Recovery Plan for this species; however, a Recovery plan is considered to be required. Priority conservation actions identified by Conservation Advice include:</p> <ul style="list-style-type: none"> <li>• management of habitat loss, disturbance and modification (including fire) including protection of unburnt habitat, revision of prescribed burning prescriptions, protection of habitat trees, avoidance of habitat fragmentation and avoidance of the use of barbed wire</li> <li>• protection of climate change refuge habitat and improve micro-climate conditions in at risk areas</li> <li>• manage invasive species threats</li> <li>• investigate the feasibility of reintroductions to areas the species was extirpated.</li> </ul> <p>The Project is unlikely to substantially interfere with the recovery of the species.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Conclusion</b>                                                                                                                       | <p>The proposed clearing of 293 ha of Greater Glider habitat, including 203.3 ha of preferred habitat, and 89.7 ha of suitable habitat, will result in a significant residual impact on the Greater Glider. The extent of these impact areas is shown in Figure 6-14.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



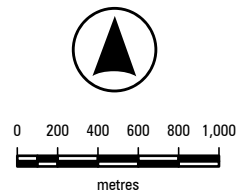


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- Legend**
- Mining Lease
  - Proposed Disturbance Boundary
  - Survey Area
  - Waterway
  - Roads

- Greater Glider Habitat**
- Preferred
  - Suitable
- Desktop Searches**
- Greater Glider Observations
  - Greater Glider Observations

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 Public Environment Report 2026

Greater Glider Significant Impact Area



### 6.2.6.3 Koala

#### 6.2.6.3.1 Species Impact Assessment

Approximately 327 ha of habitat critical to the survival of the species, comprising 6.5 ha of ‘important ecological function habitat’ and 320.5 ha of ‘suitable habitat’, is proposed to be cleared for the Project (see Figure 6-15).

The impacts on the Koala and its habitat are predominantly due to direct clearing and some habitat fragmentation. Koala habitat mostly occurs within riparian vegetation along the Isaac River, Hill Creek, the Ti-Tree Creek, and on the associated floodplains, including the west of Ti-Tree Creek. The fauna corridor formed by the Isaac River, and Hill Creek riparian vegetation will be mostly retained, only impacted by the construction of the haul road crossing and the realigned Suttor Developmental Road crossing over the Isaac River. Mitigation measures for the Isaac River crossings, detailed in Section 6.2.5.4, will minimise the impact to the fauna corridor and therefore the species mobility. Additionally, in the context of the local landscape, and given the retained vegetation west of the escarpment, connectivity for the species west of the Ti-Tree Creek will not be compromised.

The risk of changes in flood behaviour impacting vegetation is negligible (Section 6.2.5.8). One the vegetation community along the Isaac River, V4 (RE 11.3.25), has been identified as GDE. Based on the GDE report (Appendix 10), with implementation of the GDEMMP (**Appendix 19**), it is considered that the risk to GDEs posed by drawdown from Project development, ranges from low to insignificant. Therefore, changes in hydrology and groundwater are considered unlikely to impact the species habitat.

The potential for other indirect impacts to the Koala from noise and vibration, dust, erosion and sedimentation, lighting and vehicle strike is considered to be minimal given the measures that will be implemented to manage these impacts (Section 6.2.5). The Project also has the potential to increase animal pest populations if they are not appropriately managed. However, as described in Section 6.2.5.5, pest management measures will be implemented for the Project in accordance with the site Weed and Pest Management Plan (**Appendix 24**).

#### 6.2.6.3.2 Species Mitigation Measures

A description of proposed management measures is provided in Section 6.2.5. The proposed avoidance and mitigation measures for Koala, including timing, predicted effectiveness, monitoring, adaptive management and the relevant statutory or policy basis, is provided in Table 6-16.

Conservation and recovery plans relevant to the Koala have been considered in this assessment as follows:

- The ‘Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations in Queensland, New South Wales and the Australian Capital Territory’ (DAWE 2022a), outlines the reasons for the conservation assessment of the species with regard to the 2022 uplisting of the species and provides information about the species, including its distribution and habitat, threats and priority management actions.
- The ‘National Recovery Plan for the Koala’ (DAWE 2022b) considers habitat critical to the survival of a species to be the area that the species relies on to halt decline and promote the recovery of the species that can be unambiguously identified. Under the EPBC Act, the following factors and any other relevant factors may be considered when identifying habitat that is critical to the survival of a species:
  - whether the habitat is used during periods of stress (examples flood, drought or fire)
  - whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes)
  - the extent to which the habitat is used by important populations
  - whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development



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

The ‘*Phascolarctos cinereus* combined populations of Qld, NSW and the ACT–Koala’ SPRAT profile provides information about the Koala, including relevant regulatory considerations and information in relation to its population and distribution, habitat, life cycle, feeding, movement patterns, threats, abatement and recovery.

**Table 6-16 Koala Impact Avoidance and Mitigation Measures**

| Avoidance/mitigation measures                                                                                                                                                                                                                                                                      | Timing                                  | Predicted effectiveness                                                                                                                                               | Monitoring and adaptive management                                                                                                                                                                                                                                                                                                              | Statutory or policy basis                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Project infrastructure has been located to minimise direct disturbance to Koala habitat.                                                                                                                                                                                                           | Mine planning/ construction/ operations | Highly effective— minimises the extent of impacts to Koala habitat.                                                                                                   | Monitor disturbance/vegetation clearance areas against approved disturbance limits in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ).                                                                                                                                                                           | DAWE (2022a), DCCEEW (2023), DES (2022b) |
| Implement vegetation clearance protocols, including the delineation of vegetation adjoining proposed clearance areas to prevent accidental damage.                                                                                                                                                 | Construction/ operations                | Highly effective management technique to manage vegetation clearance activities.                                                                                      | Should clearing exceed approved limits, incident reporting would be initiated with a corrective action plan will be proposed (including proposed timing) and implemented in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). The corrective actions will be informed by the nature and extent of the exceedance. |                                          |
| Fauna spotter/catcher will be on-site when clearing activities occur within Koala habitat. Fauna spotter/catcher will monitor clearance activities for the Koala and any incidence of fauna mortality or injury will be recorded. Injured fauna will be taken to a wildlife carer or veterinarian. | Construction/ operations                | Highly effective management technique— vegetation clearance activities can be timed to avoid the clearance of trees until vacated by Koalas (should they be present). | Adaptive measures will be implemented, as necessary in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). Potential adaptive measures will include pre-clearance surveys and progressive clearing around known habitat trees.                                                                                      | DAWE (2022a)                             |

| Avoidance/mitigation measures                                                                                                                                       | Timing                                                       | Predicted effectiveness                                                                                                                               | Monitoring and adaptive management                                                                                                                                                                                                                                                                                            | Statutory or policy basis                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Speed limits on Project roads will be imposed to reduce the risk of vehicle strike.                                                                                 | Construction/ operations/ rehabilitation and decommissioning | Highly effective management technique to minimise the potential for vehicle strike.                                                                   | Monitor incidence of vehicle strike in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). Adaptive management measures will include signage and/or reduction in speed limits at selected locations identified as having a higher risk of vehicle strike.                                         | DAWE (2022a), DCCEEW (2023), DES (2022b)                       |
| Safe driving procedures will be incorporated into site inductions to increase awareness of the risk of vehicle strike.                                              | Construction/ operations/ rehabilitation and decommissioning | Highly effective management technique to minimise the potential for vehicle strike.                                                                   | Monitor incidence of vehicle strike in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). Adaptive management measures will include an increase in measures (frequency or methods) or signage to increase awareness                                                                              | DAWE (2022a), DCCEEW (2023), DES (2022b)                       |
| Maintain a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation of these areas by introduced fauna (e.g. feral dogs). | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests such as feral dogs.                                                | Regular monitoring of site will be carried out by environmental personnel.<br><br>Raise awareness through personnel inductions. Additional measures (such as tool box talks or staff newsletters) will be implemented if inspections indicate a clean, rubbish-free environment is not being maintained.                      | DAWE (2022a), DCCEEW (2023), Commonwealth of Australia (2017b) |
| Store domestic waste in appropriate receptacles and locations.                                                                                                      | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests, including feral dogs if site protocols are followed by personnel. | Regular monitoring of the site will be carried out by environmental personnel.<br><br>Implement site waste Management procedures.<br><br>Additional measures (such as the provision of additional receptacles or change in location of receptacles) will be implemented if current storage practices encourage feral animals. | DAWE (2022a), Commonwealth of Australia (2017b)                |

| Avoidance/mitigation measures                                                                                                                                  | Timing                                                       | Predicted effectiveness                                                             | Monitoring and adaptive management                                                                                                                                                                                                                                                           | Statutory or policy basis                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Monitor and manage pest animal populations and implementation of pest control measures in accordance with the Weed and Pest Management Plan (Section 6.2.5.5). | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests. | Corrective actions (such as increasing the frequency or extent of control efforts or alternative control strategies) will be implemented, as necessary in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ).                                                          | DAWE (2022a), Commonwealth of Australia (2017b), DAF (2023), Isaac Regional Council (2024)                                 |
| Coordinate pest management program in consideration of surrounding stakeholders.                                                                               | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests. | Monitor and manage pests in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ).<br><br>Incorporate consultation outcomes into management measures, with the management measures implemented on-site.                                                                   | DAWE (2022a), Commonwealth of Australia (2017b), Isaac Regional Council (2024)                                             |
| Minimise effects of artificial lighting.                                                                                                                       | Mine planning/ construction                                  | Effective management measure to minimise effects of artificial lighting.            | Mine planning for MIA will include lighting designs (placement, configuration and direction) to minimise light spill.                                                                                                                                                                        | DAWE (2020), AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting' (Standards Australia 2019), DES (2019) |
| Bushfire prevention and management measures will be outlined in the Emergency Response Plan. Inductions of mine site personnel will include fire awareness.    | Construction/ operations/ rehabilitation and decommissioning | Effective management procedure to reduce the risk of bushfire.                      | Any incidence of bushfire will be investigated to determine the requirement for additional controls. Potential adaptive management measures include revision of the Emergency Response Plan and/or a program to increase personnel awareness of bushfire risk (e.g. through tool box talks). | DAWE (2022a), DCCEEW (2023)                                                                                                |

#### 6.2.6.3.3 Residual Significant Impact Assessment

Table 6-17 provides an assessment of the likelihood of significant impacts on the Koala in accordance with the Commonwealth 'Significant Impact Guidelines 1.1: Matters of National Environmental Significance' (DoE 2013), with the significant impact areas (critical habitat) shown in Figure 6-15.

The population of Koala that potentially uses the habitat within the survey area has been assessed against the definition of 'important population' of a Vulnerable species (DoE 2013) and the definition in the latest conservation advice for the species (DAWE 2022a). The population has been determined to be part of a large population that is distributed throughout the broader region and maintains connectivity for breeding and dispersal throughout this area. Breeding is considered to occur amongst the population in the broader region; therefore, the population occurring in the survey area is not likely to be necessary for



maintaining species genetic diversity. The Koala range extends throughout the coast and inland areas of eastern Australia, and the survey area is not near the limits of the species range.

However, as indicated in the latest conservation advice for the species (DAWE 2022a), the Isaac River could be considered a climatically suitable refugia during periods of environmental stress including droughts, heatwaves, and long-term climate change. Therefore, the population of Koala that potentially uses the habitat within the survey area can be considered an important population.

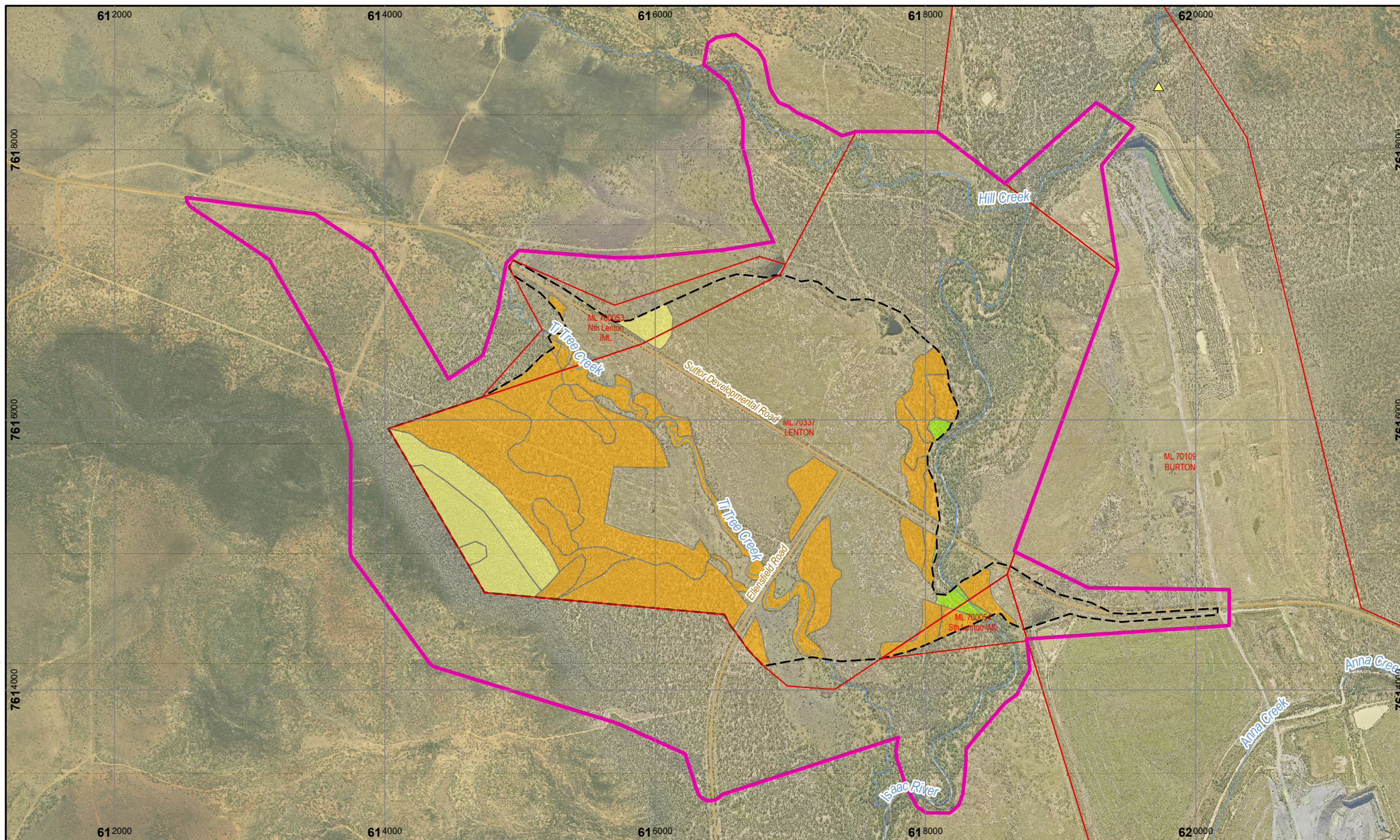
**Table 6-17 Koala Significant Impact Assessment**

| Significance criteria                                                                                                           | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Lead to a long-term decrease in the size of an important population of a species                                                | The removal of 327 ha of habitat critical to the survival of the Koala, is considered unlikely to lead to a long-term decrease in the size of an important population of the species, as the connectivity within the Isaac River and Hill Creek riparian corridors, where the species has been mostly recorded (Figure 6-9) will be retained.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Reduce the area of occupancy of an important population                                                                         | <p>The population of Koala that potentially uses the proposed disturbance area likely uses the habitat assessed as critical to the survival of the species, not the other habitat, which has limited to no value as food, shelter or dispersal habitat for the Koala.</p> <p>The removal of 327 ha of habitat critical to the survival of the Koala may reduce the area of occupancy of an important population of the species.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Fragment an existing important population into two or more populations                                                          | <p>The removal of 327 ha of habitat critical to the survival of the Koala is considered unlikely to fragment an existing population into two or more populations. The remaining vegetation will retain connectivity to the broader region of Koala habitat, in particular the riparian corridors along the Isaac River and Hill Creek, which will be retained.</p> <p>The riparian vegetation will be mostly retained, only impacted by the construction of the Isaac River crossings. Given the mitigation measures proposed for the river crossings, it is unlikely the new infrastructure will prevent the movement of the species, and therefore the Project is unlikely to fragment a population into two or more populations.</p>                                                                                                                                                                                                                                                                                                         |
| Adversely affect habitat critical to the survival of a species                                                                  | <p>There is currently no habitat for the Koala listed on the Register of Critical Habitat. However, the important and suitable Koala habitat, in the survey area are considered likely to meet the Koala conservation advice definition of habitat critical to the Koala for being located adjacent to the Isaac River.</p> <p>Approximately 327 ha of habitat critical to the survival of the Koala will be disturbed by the Project through direct clearing. This action is considered likely to adversely affect habitat critical to the survival of the species.</p> <p>The other vegetated areas within the proposed disturbed area do not meet the criteria for habitat critical to the survival of the species, and therefore, their clearing is considered unlikely to adversely affect habitat critical to the survival of the species.</p> <p>Habitat for the species will be retained within the survey area, in particular along the riparian corridors, which is expected to continue to provide its current habitat function.</p> |
| Disrupt the breeding cycle of an important population                                                                           | The removal of 327 ha of habitat critical to the survival of the species is considered unlikely to disrupt the breeding cycle of an important population. The Koala habitat retained, in particular the riparian corridors along the Hill Creek and the Isaac River is expected to remain suitable for breeding for the species. Indirect impacts will be managed such that the breeding cycle will not be disrupted of the population.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Significance criteria                                                                                                                   | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | <p>The Project requires the removal of 327 ha of habitat critical to the survival of the species.</p> <p>The removal of this extent of habitat is unlikely to lead to a long-term decline in the species population given the availability of habitat for the species in the broader region. The survey area is connected to areas of remnant vegetation habitat along the east and north-east boundaries, mainly through the riparian corridors formed by the Isaac River and the Hill Creek. These riparian corridors support mobility for the species throughout the broader region.</p> <p>The retained habitat throughout the survey area is unlikely to be indirectly impacted by the Project. Indirect impacts, such as weeds and pests, noise and vibration, dust, artificial lighting, vehicle strike and bushfire, will be managed as outlined in Section 6.2.5 and are considered not to have potential to impact the availability or quality of habitat to the extent that the Koala is likely to decline. Similarly, as indicated in Section 6.2.4.7, flood behaviour change will result in negligible impacts to the availability or quality of the species habitat.</p> <p>Based on the GDE Assessment (see Chapter 5), the risk to the GDE identified within the survey area (which forms a portion of Koala habitat in the survey area) will be low to insignificant and therefore groundwater drawdown is unlikely to impact on the availability or quality of habitat to the extent that the Koala is likely to decline.</p> |
| Result in invasive species that are harmful to a Vulnerable species becoming established in the Vulnerable species habitat              | <p>The survey area is located in a modified rural landscape, and invasive species that are harmful to the Koala exist in the broader region. While predatory species, including wild dogs, are recorded to be established in the survey area, the Project is unlikely to result in the introduction and establishment of any invasive species that are harmful to the Koala within the survey area.</p> <p>Monitoring and management of pests, including corrective actions, will be implemented in accordance with the Weed and Pest Management Plan (Section 6.2.5.5).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Introduce disease that may cause the species to decline, or                                                                             | <p>Koala populations are affected by three known viral diseases which are widespread throughout the wild population. These diseases are likely to be present in the population in the survey area; however, the proposed Project is unlikely to cause the introduction of these diseases or other diseases to the survey area. The Koala population in the survey area will retain connectivity to the surrounding Koala habitat and will, therefore, remain exposed to infections from the broader region.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Interfere substantially with the recovery of the species                                                                                | <p>The Recovery Plan for the Koala identifies that direct threats to the Koala include climate change, land-use changes and natural system modifications, while ecological threatening processes include habitat loss and fragmentation, habitat degradation and genetic effects.</p> <p>There is currently no habitat for the Koala listed on the Register of Critical Habitat. However, 327 ha of habitat is considered likely to meet the Koala conservation advice definition of habitat critical to the survival of the Koala. Therefore, the impact of the Project on the Koala habitat in the proposed impact area may interfere with the recovery of the species.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Conclusion</b>                                                                                                                       | <p>The Project will result in the clearing or disturbance of 327 ha of habitat critical to the survival of the Koala. This habitat is identified as likely to be critical habitat for the survival of the species and, therefore, the Project is likely to have a significant impact to the Koala. The extent of these impact areas is shown in Figure 6-15.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



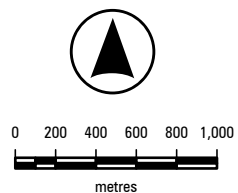
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Datum: MGA94 Zone 55  
 Scale: 1 : 22,500 (A4)  
 Date: 28/08/2026 7:11 AM  
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- Legend**
- Mining Lease
  - Proposed Disturbance Boundary
  - Survey Area
  - Waterway
  - Roads

- Koala Habitat**
- Critical - Important
  - Critical - Suitable
  - Not Critical - Other
- Desktop Searches**
- ▲ Koala Observations

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Koala Significant Impact Area



## 6.2.6.4 Squatter Pigeon

### 6.2.6.4.1 Species Impact Assessment

A total of 192.3 ha of Squatter Pigeon habitat is proposed to be cleared for the Project, comprising 150.3 ha of potential breeding habitat, and 42 ha of additional foraging habitat (see Figure 6-16).

The land disturbance associated with the Project will result in some fragmentation of Squatter Pigeon habitat; however, this is unlikely to be significant given the mobility of this species.

The risk of changes in flood behaviour impacting vegetation is negligible (Section 6.2.5.8). One the vegetation community along the Isaac River, the V4 (RE 11.3.25), has been identified as GDE. Based on the GDE report (Appendix 10), with implementation of the GDEMMP (**Appendix 19**), it is considered that the risk to GDEs posed by drawdown from Project development, ranges from low to insignificant. Therefore, changes in hydrology and groundwater are considered unlikely to impact the species habitat.

The potential for indirect impacts on the Squatter Pigeon from noise and vibration, dust, lighting and vehicle strike are considered to be minimal given the measures that will be implemented to manage these impacts (Section 6.2.5). The Project also has the potential to increase weed and animal pest populations if they are not appropriately managed. However, weed and pest management measures will be implemented for the Project in accordance with the site Weed and Pest Management Plan (Section 6.2.5.5).

### 6.2.6.4.2 Species Mitigation Measures

A description of proposed management measures is provided in Section 6.2.5. The proposed avoidance and mitigation measures for Squatter Pigeon, including timing, predicted effectiveness, monitoring, adaptive management and the relevant statutory or policy basis, is provided in Table 6-18.

The following conservation, recovery and threat abatement plans are relevant to the Squatter Pigeon and have been considered in assessment of the Squatter Pigeon:

- The ‘Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon [southern])’ (TSSC 2015), developed at the time of EPBC Act listing and ‘*Geophaps scripta scripta*–Squatter Pigeon (southern)’ SPRAT profile provides information about the species, including its distribution, biology/ecology, threats and conservation actions and priorities.

The SPRAT profile for this species indicates that there is no adopted or made Recovery Plan for this species, as the approved conservation advice provides sufficient direction to implement priority actions and mitigate against key threats.

The ‘Survey guidelines for Australia’s threatened birds’ includes information on Squatter Pigeon and recommended methods for survey.

Three threat abatement plans are listed in the SPRAT profile (DCCEEW 2023) as being relevant to the Squatter Pigeon, namely:

- Department of the Environment Threat abatement plan for predation by feral cats
- Department of the Environment and Energy Threat abatement plan for competition and land degradation by rabbits
- Department of the Environment, Water, Heritage and the Arts Threat abatement plan for predation by the European red fox.

**Table 6-18 Squatter Pigeon Impact Avoidance and Mitigation Measures**

| Avoidance/mitigation measures                                                                                                                                                                                                                                                                                                                                                                        | Timing                                                     | Predicted effectiveness                                                             | Monitoring and adaptive management                                                                                                                                                                                                                                                                                                      | Statutory or policy basis                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Project infrastructure will be located to minimise direct disturbance to Squatter Pigeon habitat.                                                                                                                                                                                                                                                                                                    | Mine planning/construction/operations                      | Highly effective—minimises the extent of impacts to Squatter Pigeon habitat.        | Monitor disturbance/vegetation clearance areas against approved disturbance limits in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ).                                                                                                                                                                   | TSSC (2015)                                                                               |
| Disturbance areas will be delineated to prevent accidental damage to adjacent Squatter Pigeon habitat.                                                                                                                                                                                                                                                                                               | Construction/operations                                    | Highly effective management technique to manage Project disturbance activities.     | Should clearing exceed approved limits, incident reporting would be initiated with a corrective action plan proposed (including proposed timing) and implemented in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ). The corrective actions will be informed by the nature and extent of the exceedance. |                                                                                           |
| Regularly inspect mine-related surface disturbance areas to identify areas requiring weed management measures to be implemented in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ).<br><br>Implement weed management measures in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ) (e.g. mechanical removal and application of approved herbicides). | Construction/operations/rehabilitation and decommissioning | Effective management measure to manage the spread and occurrence of weeds.          | Monitoring and management of weeds in accordance with the Weed and Pest Management Plan. Corrective actions (such as increasing the frequency or extent of control efforts, or alternative control strategies) will be implemented, in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ).                        | TSSC (2015), Commonwealth of Australia (2017a), DAF (2023), Isaac Regional Council (2024) |
| Maintain a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation of these areas by introduced fauna.                                                                                                                                                                                                                                                    | Construction/operations/rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests. | Regular monitoring of the site will be carried out by environmental personnel.<br><br>Raise awareness through personnel inductions. Additional measures (such as tool box talks or staff newsletters) will be implemented if inspections indicate a clean, rubbish-free environment is not being maintained.                            | TSSC (2015), Commonwealth of Australia (2017b)                                            |

| Avoidance/mitigation measures                                                                                                                               | Timing                                                       | Predicted effectiveness                                                                                                         | Monitoring and adaptive management                                                                                                                                                                                                                                                                              | Statutory or policy basis                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Store domestic waste in appropriate receptacles and locations.                                                                                              | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests if site protocols are followed by personnel. | Regular monitoring of site will be carried out by environmental personnel.<br><br>Implement waste management procedures.<br><br>Additional measures (such as provision of additional receptacles or change in location of receptacles) will be implemented if current storage practices encourage feral animals | TSSC (2015), Commonwealth of Australia (2017b)                                                                   |
| Monitor pest animal populations and implementation of pest control measures in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ).    | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests                                              | Corrective actions (such as increasing the frequency or extent of control efforts or alternative control strategies) will be implemented in accordance with the Weed and Pest Management Plan ( <b>Appendix 24</b> ).                                                                                           | TSSC (2015), Commonwealth of Australia (2017b), DAF (2023), Isaac Regional Council (2024), DoEE (2016)           |
| Coordinate pest management program in consideration of surrounding stakeholders.                                                                            | Construction/ operations/ rehabilitation and decommissioning | Effective management measure to manage the occurrence and abundance of feral pests.                                             | Monitor and manage pests in accordance with the Weed and Pest Management Plan (Section 6.2.5.5).<br><br>Incorporate consultation outcomes into management measures, with the management measures implemented on site.                                                                                           | TSSC (2015), Commonwealth of Australia (2017a), Commonwealth of Australia (2017b), Isaac Regional Council (2024) |
| Bushfire prevention and management measures will be outlined in the Emergency Response Plan. Inductions of mine site personnel will include fire awareness. | Construction/ operations/ rehabilitation and decommissioning | Effective management procedure to reduce the risk of bushfire.                                                                  | Any incidence of bushfire will be investigated to determine the requirement for additional controls. Potential adaptive management measures include revision of the Emergency Response Plan and/or a program to increase personnel awareness of bushfire risk (e.g. through tool box talks).                    | TSSC (2015)                                                                                                      |

#### 6.2.6.4.3 Residual Significant Impact Assessment

Table 6-19 provides an assessment of the likelihood of significant impacts on the Squatter Pigeon in accordance with the Commonwealth ‘Significant Impact Guidelines 1.1: Matters of National Environmental Significance’ (DoE 2013), with significant impact areas shown in Figure 6-16.

The Squatter Pigeon population occurring at the survey area is not part of the sub-population occurring south of the Carnarvon Ranges, which is an important sub-population (DCCEEW 2023). The species occurs regularly north of the Carnarvon Ranges and is considered one population occurring commonly



throughout the northern range. The population occurring at the survey area is part of this northern population that has connectivity across a large area for dispersal and breeding.

The Squatter Pigeon range extends south to northern NSW, north to Mackay and west to near Longreach. Therefore, the population occurring at the survey area is not located near the limit of the species range.

Therefore, the Squatter Pigeon occurring at the survey area is neither:

- a key source population for breeding or dispersal
- a population that is necessary for maintaining genetic diversity, nor
- a population that is near the limit of the species range.

The population of Squatter Pigeon that uses the survey area is considered unlikely to be an important population according to the criteria of the Significant Impact Guidelines (DoE 2013).

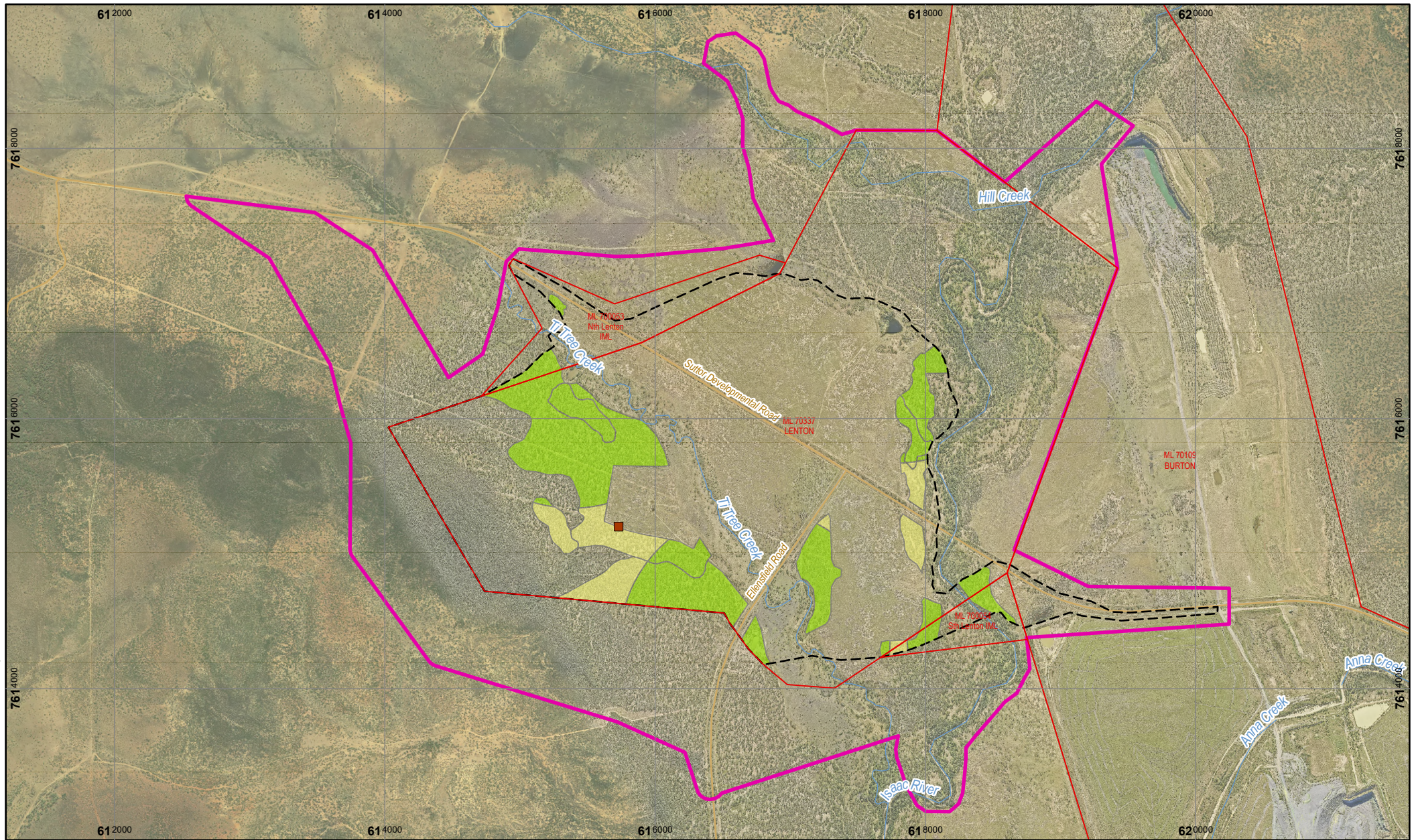
**Table 6-19 Squatter Pigeon Significant Impact Assessment**

| Significance criteria                                                                                                                   | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Lead to a long-term decrease in the size of an important population of a species                                                        | <p>The population of Squatter Pigeon that uses habitat within the survey area is considered not to be an important population.</p> <p>The removal of 192.3 ha of Squatter Pigeon habitat will not lead to a long-term decrease in the size of an important population.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Reduce the area of occupancy of an important population                                                                                 | <p>The population of Squatter Pigeon that uses habitat within the survey area is considered not to be an important population.</p> <p>The removal of 192.3 ha of Squatter Pigeon habitat is considered unlikely to reduce the area of occupancy of an important population.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Fragment an existing important population into two or more populations                                                                  | <p>The population of Squatter Pigeon that uses the habitat within the survey area is considered not to be an important population.</p> <p>The removal of 192.3 ha of Squatter Pigeon habitat is considered unlikely to fragment an existing important population into two or more populations.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Adversely affect habitat critical to the survival of a species                                                                          | <p>There is currently no habitat for the Squatter Pigeon listed on the Register of Critical Habitat. The Squatter Pigeon habitat to be impacted by the Project is considered not critical to the survival of the species as, while the habitat is used by a local population of the species, the areas are unlikely to be necessary for the species as a whole for activities such as foraging, breeding, roosting, dispersal, the long-term maintenance of the species, maintaining genetic diversity; and for the reintroduction or recovery of the species.</p>                                                                                                                                                                                                         |
| Disrupt the breeding cycle of an important population                                                                                   | <p>The population of Squatter Pigeon that uses habitat within the survey area is considered not to be an important population.</p> <p>The removal of 192.3 ha of Squatter Pigeon habitat is considered unlikely to disrupt the breeding cycle of an important population.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | <p>The Project requires the removal of 192.3 ha of Squatter Pigeon habitat, including 150.3 ha of potential breeding habitat, and 42 ha of foraging habitat.</p> <p>The removal of this extent of habitat is unlikely to lead to a long-term decline in the species population given the wider extent of habitat for this species.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Result in invasive species that are harmful to a Vulnerable species becoming established in the Vulnerable species habitat              | <p>The survey area is located in a modified rural landscape, and invasive species that are harmful to the Squatter Pigeon exist in the broader region. Predatory species, including feral cat and feral fox, have been recorded and are established in the survey area and are recognised threats to the Squatter Pigeon. Buffel grass, which can change understory cover, is already established throughout the survey area. The Project is unlikely to result in the introduction and establishment of any invasive species that are harmful to the Squatter Pigeon in the habitat present in the survey area.</p> <p>Monitoring and management of pests including corrective actions will be implemented in accordance with the site Weed and Pest Management Plan.</p> |
| Introduce disease that may cause the species to decline, or                                                                             | <p>No diseases are listed as a threat to the Squatter Pigeon. The Project is unlikely to introduce a disease that may cause the species to decline.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Interfere substantially with the recovery of the species                                                                                | <p>There is no adopted or made Recovery Plan for this species. The approved conservation advice provides direction to implement priority actions for this species and mitigate against key threats. Priority conservation and management actions include the identification of sub-populations of high conservation priority, development of conservation agreements and control of feral herbivores. The Project is unlikely to substantially interfere with the recovery of the species.</p>                                                                                                                                                                                                                                                                             |

| Significance criteria | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Conclusion</b>     | <p>The Project is considered unlikely to result in a significant impact to the Squatter Pigeon. The impacted habitat is not considered to be utilised by an important population.</p> <p>Similar habitat for the species is abundant within wider region and the proposed disturbance won't affect the landscape connectivity identified within the survey area and the broader region.</p> <p>Nevertheless, the species and species habitat have been identified within the proposed disturbance area, and the Commonwealth PER guideline has identified that this species may be subject significant residual impacts. Based on this assumption in the PER guideline, clearing 192.3 ha of suitable habitat for the Squatter Pigeon may result in significant residual impacts to the species.</p> <p>The extent of these impact areas is shown in Figure 6-16.</p> |



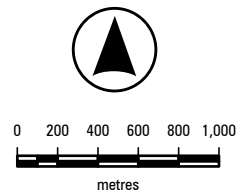
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|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Legend</b>                                                                                                                   |                                                                                                                                |
| <span style="border: 1px solid red; display: inline-block; width: 20px; height: 10px;"></span> Mining Lease                     | <span style="background-color: #90EE90; display: inline-block; width: 20px; height: 10px;"></span> Squatter Pigeon Habitat     |
| <span style="border: 1px dashed black; display: inline-block; width: 20px; height: 10px;"></span> Proposed Disturbance Boundary | <span style="background-color: #3CB371; display: inline-block; width: 20px; height: 10px;"></span> Breeding                    |
| <span style="border: 2px solid magenta; display: inline-block; width: 20px; height: 10px;"></span> Survey Area                  | <span style="background-color: #90EE90; display: inline-block; width: 20px; height: 10px;"></span> Foraging                    |
| <span style="color: blue;">—</span> Waterway                                                                                    | <span style="background-color: #8B4513; display: inline-block; width: 10px; height: 10px;"></span> Squatter Pigeon Observation |
| <span style="color: orange;">—</span> Roads                                                                                     |                                                                                                                                |

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Squatter Pigeon Significant Impact Area



### 6.2.6.5 White-throated Needletail

#### 6.2.6.5.1 Species Impact Assessment

A total of 309.6 ha of remnant vegetation is proposed to be cleared for the Project. The clearance of remnant vegetation / White-throated Needletail habitat for the Project will not fragment habitat for this highly mobile species. Flyover habitat for the White-throated Needletail is shown in Figure 6-11.

#### 6.2.6.5.2 Species Mitigation Measures

A description of proposed management measures is provided in Section 6.2.5. The proposed avoidance and mitigation measures for White-throated Needletail, including timing, predicted effectiveness, monitoring, adaptive management and the relevant statutory or policy basis, is provided in Table 6-20.

The following conservation, recovery and threat abatement information has been considered for assessment of the White-throated Needletail:

- The ‘Approved Conservation Advice for *Hirundapus caudacatus* (White-throated Needletail)’ (TSSC 2019), developed at the time of EPBC Act listing and the ‘*Hirundapus caudacutus*–White-throated Needletail’ SPRAT profile provides information about the White-throated Needletail, including its distribution, biology/ecology, threats and conservation actions and priorities.

The SPRAT profile for this species indicates there is no adopted or made Recovery Plan for this species, as the approved conservation advice (TSSC 2019) provides sufficient direction to implement priority actions and mitigate against key threats and enable recovery.

The ‘Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act’ provides information on 14 migratory species, including the White-throated Needletail. The referral guideline describes important non-breeding habitat for the White-throated Needletail.

**Table 6-20 White-throated Needletail Impact Avoidance and Mitigation Measures**

| Avoidance/mitigation measures                                                                                                                                        | Timing                                  | Predicted effectiveness                                                          | Monitoring and adaptive management                                                                                                                                                                                                                    | Statutory or policy basis |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Project infrastructure has been located to avoid or minimise direct disturbance to remnant vegetation.                                                               | Mine planning/ construction/ operations | Highly effective—minimises the extent of impacts to woodland habitats.           | Monitor disturbance/vegetation clearance areas against approved disturbance limits in accordance with the MNES Species Impact Management Plan ( <b>Appendix 23</b> ).                                                                                 | TSSC (2019), DoE (2015)   |
| Implement vegetation clearance protocols, including the delineation of vegetation adjoining proposed clearance areas to prevent accidental damage (Section 6.2.5.1). | Construction/ operations                | Highly effective management technique to manage vegetation clearance activities. | Should clearing exceed approved limits, incident reporting would be initiated with a corrective action plan proposed (including proposed timing) and implemented. The corrective actions will be informed by the nature and extent of the exceedance. |                           |

#### 6.2.6.5.3 Residual Significant Impact Assessment

Table 6-21 provides an assessment of the likelihood of significant impacts on the White-throated Needletail in accordance with the Commonwealth ‘Significant Impact Guidelines 1.1: Matters of National Environmental Significance’ (DoE 2013).

The White-throated Needletail population occurring at the survey area has been assessed against the definition of ‘important population’ of a Vulnerable species (DoE 2013). The survey area is located near

the centre of the White-throated Needletail range within Australia. Dispersal and genetic exchange is likely to occur between the population occupying the survey area and the population occupying the broader region. It is considered that the population occupying the survey area is not likely to be:

- a key source population for breeding or dispersal
- a population necessary for maintaining genetic diversity, or
- a population near the limit of the species range.

Therefore, the population occupying the survey area is not considered an important population.

**Table 6-21      *White-throated Needletail Significant Impact Assessment***

| Significance criteria                                                                                                                   | Assessment of significance                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An action is likely to have a significant impact on a Vulnerable species if there is a real chance or possibility that it will:         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Lead to a long-term decrease in the size of an important population of a species                                                        | Although two subspecies of White-throated Needletails breed in separate populations in the Northern Hemisphere, only one occurs in Australia where they do not occur as smaller populations. The clearing of 309.6 ha of remnant vegetation for the Project is unlikely to decrease the size of the population given the extent of habitat available to this species across eastern and south-eastern Australia.                                                                     |
| Reduce the area of occupancy of an important population                                                                                 | The population of the White-throated Needletail that may use habitat within the survey area is considered not to be an important population. The extent of vegetation clearing required for the Project is unlikely to reduce the area of occupancy of this species. Tracts of native vegetation which can provide roosting habitat will remain within the New Lenton MLs and is widespread in the region. The survey area habitat will continue to provide aerial foraging habitat. |
| Fragment an existing important population into two or more populations                                                                  | The White-throated Needletail migrates to Australia during the non-breeding season and is widespread across eastern and south-eastern Australia. The Project will not fragment the population into two or more populations.                                                                                                                                                                                                                                                          |
| Adversely affect habitat critical to the survival of a species                                                                          | There is currently no habitat for the White-throated Needletail listed on the Register of Critical Habitat. Habitat within the Project disturbance area does not represent habitat critical to the survival of the species.                                                                                                                                                                                                                                                          |
| Disrupt the breeding cycle of an important population                                                                                   | The White-throated Needletail does not breed in Australia. The Project will not disrupt the breeding cycle.                                                                                                                                                                                                                                                                                                                                                                          |
| Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | Primarily an aerial species, the White-throated Needletail predominantly forages aerially, feeding on a wide variety of insects. They roost in forest and woodlands. While the Project will include some vegetation clearance, it will not reduce the quality or availability of habitat to the extent that the species is likely to decline.                                                                                                                                        |
| Result in invasive species that are harmful to a Vulnerable species becoming established in the Vulnerable species habitat              | Invasive species are not a serious threat to the White-throated Needletail. The Project is unlikely to result in invasive species that are harmful to the White-throated Needletail.                                                                                                                                                                                                                                                                                                 |
| Introduce disease that may cause the species to decline                                                                                 | Disease is not a known threat to the White-throated Needletail. The Project is unlikely to introduce a disease that may cause the species to decline.                                                                                                                                                                                                                                                                                                                                |
| Interfere substantially with the recovery of the species                                                                                | There is no recovery plan for this species. Priority conservation actions identified for this species include working with governments in East Asia to minimise disturbance to breeding habitats and the identification and protection of important habitats in Australia. The Project is unlikely to substantially interfere with the recovery of the species.                                                                                                                      |
| <b>Conclusion</b>                                                                                                                       | The area of habitat proposed to be cleared and the limited importance of the habitat present, indicate the Project is unlikely to have a significant impact on the White-throated Needletail.                                                                                                                                                                                                                                                                                        |



### 6.2.7 Summary of Impacts

Based on the assessments of likelihood of occurrence, and the significant impact assessments for those TECs and species assessed as known, likely or potentially occurring, the Project is likely to have a significant impact on the following MNES:

- Poplar Box Grassy Woodland on Alluvial Plains TEC – 112.2 ha
- Greater Gilder – 293 ha
- Koala – 327 ha
- Squatter Pigeon (Southern) – 192.3 ha.

A Biodiversity Offset Area Management Plan (OAMP) has been developed to offset significant residual impacts for these TEC and species; refer to Chapter 7 and **Appendix 26**.

## 6.3 Aquatic Ecology

### 6.3.1 Aquatic Ecology Setting

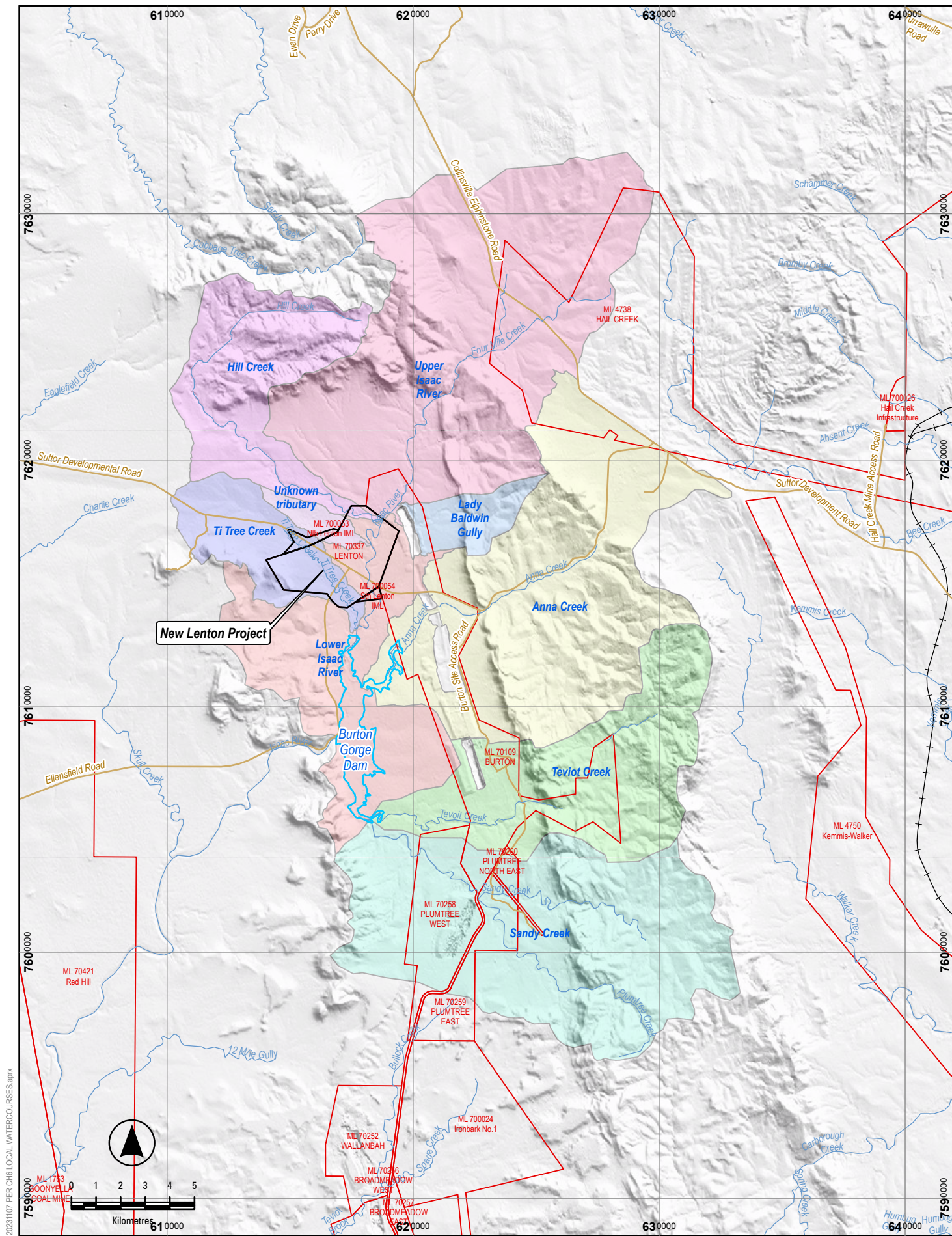
The Project is situated in the upper Isaac River sub-catchment of the Fitzroy River Basin. Parts of the Project's MLs lie on the Isaac River floodplain, in association with the upper reaches of the Isaac River.

The total area of the Isaac River catchment is approximately 22,000 km<sup>2</sup>. The Isaac River catchment has historically been impacted by farming activities, with broad-scale clearing occurring for both cropping and grazing requirements. The upper Isaac River sub-catchment is dominated by cattle grazing, with large areas cleared of vegetation, and grass species (e.g. Buffel Grass) introduced to increase stock holding capacities. The region is also subject to coal mining activities, with companies using both open cut and underground mining techniques to access coal resources. Coal seam gas (CSG) extraction also coincides with underground coal mining activities in the region.

Regional and local catchments are shown in Chapter 4. Local watercourses and drainage features intersecting and surrounding the New Lenton MLs are shown in Figure 6-17. The Isaac River has an altitude of approximately 305 m AHD in the New Lenton MLs, with some minor undulations in the Isaac River across the New Lenton MLs.

The Project contains several unnamed drainage features (as determined under the *Water Act 2000*), in the form of first and second order streams. Ti-Tree Creek runs in a generally southeast direction across the New Lenton MLs before joining with the Isaac River downstream of the MLs. Hill Creek runs roughly southeast across the northern boundary of the New Lenton MLs and joins with the Isaac River shortly after it enters the MLs. Ti-Tree Creek was determined by DoR to be a drainage feature, whilst Hill Creek and the Isaac River were determined to be watercourses under the *Water Act 2000*. No natural wetlands occur on the New Lenton MLs, however there are some stock watering dams.

Burton Gorge Dam, a man-made structure that primarily supplies water for regional mining purposes, is located approximately 3.5 km downstream of the Project. The Burton Gorge Dam is identified to hold the following environmental values: aquatic ecosystems, stock water, recreation (primary, secondary and visual), drinking water, industrial use and cultural and spiritual values (DES 2013). Surface water use in the immediate receiving environment of the Project is primarily stock watering.



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Datum: MGA94 Zone 55  
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DISCLAIMER: Third party data sources are used in this map compilation. Minserve makes no warranty regarding this data's accuracy or currency.

**LEGEND**

- |                    |                        |                   |
|--------------------|------------------------|-------------------|
| New Lenton Project | <b>Local Catchment</b> | Teviot Creek      |
| ML                 | Anna Creek             | Ti Tree Creek     |
| Waterway           | Hill Creek             | Unknown tributary |
| Roads              | Lady Baldwin Gully     | Upper Isaac River |
| Railway            | Lower Isaac River      | Burton Gorge Dam  |
|                    | Sandy Creek            |                   |

**NEW LENTON COAL PROJECT**  
**Public Environment Report 2026**



**Local Watercourses and Drainage Features**



### 6.3.2 Assessment Methodology

An assessment of potential impacts to aquatic ecology from the Project is based on the following reports:

- New Lenton Mine Aquatic Ecology Assessment Prepared for New Lenton Coal Pty Ltd, August 2019, by AARC Environmental Solutions Pty Ltd (AARC, 2019). This report, provided as **Appendix 14**, supported the EA amendment for the Project, subsequently approved by DES in January 2021. This report provides specific information relevant to the aquatic ecology of the Project area and surrounds. However, it is noted that the Project disturbance area, as presented in this PER, has been expanded in some areas compared to that reported in **Appendix 14**. The assessment of impacts from the Project (as described in this chapter) has utilised baseline information reported in **Appendix 14** for assessing Project impacts, which supersedes the assessment of impacts and mitigation measures provided in Section 8 and 9 of **Appendix 14**.
- Isaac Downs Coal Project Aquatic Ecology Study Prepared for: Stanmore IP South Pty Ltd prepared by frc environmental (frc, 2020). This report was prepared as part of the Isaac Downs project environmental impact statement (EIS), with the Isaac Downs project EA and Referral approved by the State and Commonwealth in May 2021.

The Isaac Downs project is relevant to the Project as:

- It is a similar open cut coal mine project located adjacent to the Isaac River approximately 80 km downstream of the Project.
- The relevant aquatic ecological MNES (listed aquatic species) identified through an EPBC Act protected matters search are the same for the Project and the Isaac Downs project.
- As demonstrated in the assessment below, the nearest suitable habitat for the identified aquatic species (i.e. white throated snapping turtle, Fitzroy River turtle and Murray cod), is 150 – 180 km downstream from the Isaac Downs project. Hence the nearest suitable habitat for these species is 230 – 260 km downstream of the Project.

### 6.3.3 Desktop Data

As described in **Appendix 14**, national and state databases were reviewed to determine aquatic ecology values of the Project area and surrounds, including an EPBC Act protected matters search. **Appendix B of Appendix 14** described the likelihood of occurrence of species identified through the desktop assessment.

The EPBC Act listed aquatic species assessed for likelihood of occurrence were:

- Murray cod (*Maccullochella peelii*)
- white throated (southern) snapping turtle (*Elseya albagula*)
- Fitzroy River turtle (*Rheodytes leukops*).

The assessment found that all three of these species were unlikely to occur in the Project area, as these species require permanent waterbodies or permanently flowing water, and therefore habitat does not exist for these species.

### 6.3.4 Surveys

#### 6.3.4.1 Timing and Location of Surveys

As described in **Appendix 14**, aquatic ecology field surveys were undertaken during the wet to post-wet period to maximise the opportunity of water being available onsite, and aquatic dependant species, especially those of a transient nature, to potentially occur within and surrounding the Project area. The following surveys were undertaken:

- Summer survey, 2018. An aquatic survey undertaken across the Project area was conducted during the wet season over six days from 22 to 27 February 2018. Weather conditions were typical

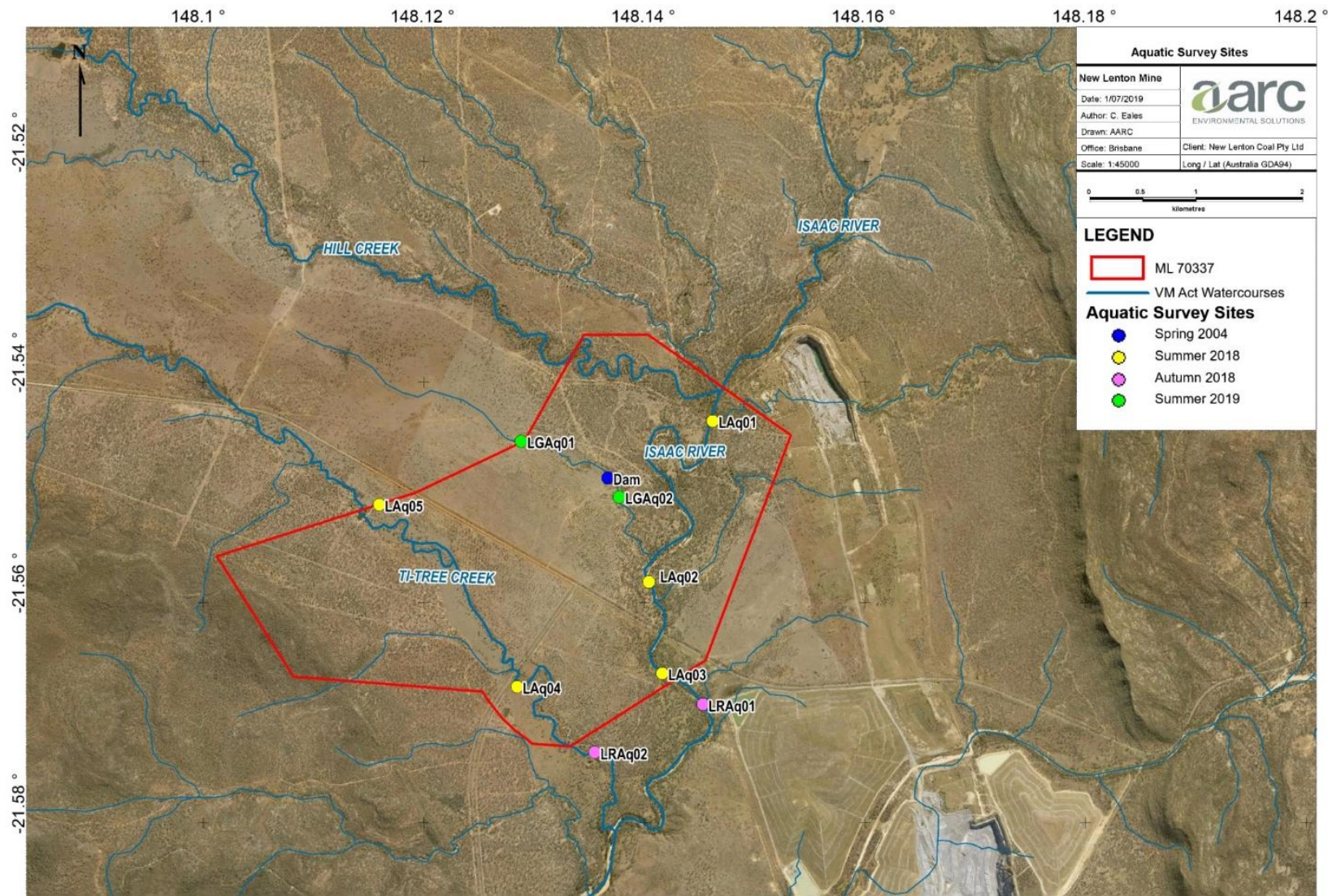


of the region during the summer months, with episodic periods of heavy rainfall followed by hot and humid conditions. High rainfall events recorded in February caused the Isaac River to flow, with constant flow for approximately 12 days before quickly subsiding.

- Autumn survey, 2018. This survey was conducted during the post-wet season over five days from the 30 April to 4 May 2018.
- Autumn survey, 2019. A survey was undertaken during the post-wet season over seven days from 2 to 8 April 2019. Weather conditions leading up to survey included episodic periods of heavy rainfall followed by hot and humid conditions.

Surveys were undertaken at the locations shown in Figure 6-18, comprising upstream and downstream locations on:

- Isaac River
- Ti-Tree Creek
- Unnamed tributary north of Ti-Tree Creek.



**Figure 6-18** Aquatic Ecology Survey Locations

#### 6.3.4.2 Survey Methods

Surveys comprised surface water quality sampling, stream sediment sampling, riparian vegetation assessment, aquatic fauna surveys using trapping and netting techniques, macroinvertebrate sampling, habitat bioassessment and condition assessment. Sampling and surveys were undertaken in accordance with regulatory standards.

#### 6.3.5 Survey Results

Field survey results are reported in full in **Appendix 14**. This section summarises the findings.

##### 6.3.5.1 Water Quality

Generally, water quality at all sites was consistent with guideline values and water quality objectives for the catchment. However, the measured baseline water quality in the Isaac River and Ti-Tree Creek did exceed objectives or guideline values:

- at all sites for turbidity
- at the Ti-Tree Creek upstream site for suspended solids
- at all sites for dissolved aluminium, copper and zinc concentrations
- at all sites for total aluminium and copper concentrations
- three of five sites for nickel
- at the Ti-Tree Creek upstream site for hydrocarbons.

##### 6.3.5.2 Sediment Quality

Elevated concentrations of nickel were found in sediment in Ti-Tree Creek, and are thought to be representative of the local baseline sediment in this small ephemeral drainage.

Particle size analysis showed that the Isaac River contains almost exclusively sand sediment, with some occasional gravel. Ti-Tree Creek has a higher fine sediment composition, which was reflected in the typically silty clay base encountered. The unnamed tributary had a similar sandy-clay sediment composition to Ti-Tree Creek, with both waterways flowing through an alluvial plain with a high concentration in fine particles (clay and silt).

##### 6.3.5.3 Physical Assessment

At each aquatic site the full AusRivAS Physical Assessment Protocol (Parsons et al. 2002) was followed. This assessment looks at the physical degradation of the banks for receiving waterways (bank shape, bank slope, artificial bank stability features etc.), quality characteristics (e.g. sediment, water oils and odours, turbidity, etc.), and erosion characteristics.

Across all sites, erosion on the banks of the receiving waters was observed. Although some levels of erosion are expected in the natural landscape, more extensive erosion was observed at sites LAq05 (Ti-Tree Creek, upstream), LGAq01 and LGAq02 (both on the un-named tributary). The leading cause of local erosion appeared to be stock access, runoff and the influence of agricultural clearing.

##### 6.3.5.4 Habitat Bioassessment

A habitat bioassessment was performed at selected sites using a modified version of the AusRivAS protocols (Conrck & Cockayne 2001). The assessment considered morphological characteristics of waterways only; including the broad habitat type, channel pattern, water level and flow, substrate character and cover, bed and bank stability, and riparian cover at each site. The habitat bioassessment scores from the aquatic sites within the study area fell into the moderate and poor categories.



#### 6.3.5.5 Condition Assessment

The assessment considers the relative impact/influence of ten different upstream activities on the waterways; including agriculture, major extractive industry, major urban areas, waste water discharge, dams/weirs, alteration to seasonal flow, alteration to riparian zone, erosion damage by stock, major geomorphological changes, and alteration activities to instream conditions and habitats.

The effect of upstream impacts on biological health of waterways within the Project area was low across most sites. The most significant alteration to stream flow was identified as damage to riparian banks by stock access and erosion. The current land use across the Project area is predominantly cattle grazing, which is reliant on natural waterways in the absence of regular watering stations. Erosional effects from stock access are amplified during periods of high flow and heavy rain fall, resulting in gullies and scarps in and around the key waterways associated with the Project.

#### 6.3.5.6 Macroinvertebrates

The Isaac River is highly ephemeral, due to its sandy bed and the typically intermittent rainfall in the sub-basin. According to AusRivAS, water needs to be present within a system for four weeks for a macroinvertebrate community to be mature enough for adequate sampling. The abrupt flow and quick cessation of this system due to intermitted rainfall events rarely leads to flows being present long enough for development of a macroinvertebrate population suitable for sampling. Macroinvertebrate sampling was only conducted at three out of seven aquatic sites, due to lack of suitable habitat for sampling. The total abundance of macroinvertebrates recorded was very low. This is likely a result of the abrupt flow pattern, and underdeveloped populations available during the small sampling window. Although low, these results are typical of highly ephemeral systems such as the Isaac River.

#### 6.3.5.7 Riparian Flora Assessment

No flora species of conservation significance were identified within the study area. Species richness was moderate to low at riparian monitoring sites, likely due to several external environmental pressures, such as exotic weed invasion, vegetation clearing and stock access.

A total of 29 introduced flora species were identified during the aquatic assessment. Historically, the study area has been used for cattle grazing, and as such, areas of high disturbance are present. Approximately half of the Project area has undergone clearing to develop improved pastureland. As a result, favourable conditions for weeds have led to local dominance of exotic grasses and other weeds. The banks of the Isaac River and its tributaries have been heavily invaded by *Megathyrsus maximus* (green panic). A variety of other common weeds are present in the ground layer throughout the riparian vegetation, and are commonly known to occur throughout the broader region.

#### 6.3.5.8 Aquatic Fauna

A total of 11 aquatic fauna species have been recorded within the study area, comprising three crustacea, five fishes and three amphibians. No aquatic fauna species of conservation significance, including those identified through the EPBC Act protected matter searches, were identified within the study area.

#### 6.3.5.9 Summary of Findings – Isaac River

The Isaac River has a wide bed and is a highly ephemeral system, primarily made up of sandy sediments with some gravel. Water quality observed within the Isaac River was reflective of a large ephemeral system in a slightly to moderately disturbed condition, typical of other systems in central Queensland which are influenced by the agricultural industry. Turbidity levels were high, likely due to the flows occurring during sampling, and elevated concentrations of dissolved aluminium, copper and zinc were noted at all sites, as well as elevated silver concentrations downstream of the Suttor Developmental Road.

The Isaac River ranked in the moderate category for bioassessment scores. It has a remnant and healthy riparian strip, that is sometimes accompanied by a continuous band of woodland on the adjacent

floodplain. The banks are typically vegetated, providing structural support, with few bare zones. However the wide flat river bed has a limited occurrence of logs, overhangs, pools or boulders. The river therefore provides minimal habitat for aquatic fauna species or macroinvertebrates, which was reflected in the relatively few species trapped and limited presence of macroinvertebrates.

The Isaac River sites ranked best onsite during the condition assessment, due to the presence of adjacent vegetation and steep banks that limited direct stock access. Also due to the remnant vegetation strip, the Isaac River had the highest flora species richness, however it was still subject to heavy weed invasion in most areas, with the waterway providing the ready spread of weeds.

#### **6.3.5.10 Summary of Findings – Ti-Tree Creek and Unnamed Tributary**

Ti-Tree Creek is a determined drainage feature (i.e. not a defined watercourse) under the Water Act. The morphology of this feature varies from a narrow bed cut deeply into the sediment, to a wide drain with no defined banks. It displays a far high proportion of fine sediments such as silt and clay, with a varying sand component. Due to these less porous sediments, Ti-Tree Creek will typically maintain a small number of standing pools, for longer than the Isaac River. Water quality was reflective of a small ephemeral system in a slightly to moderately disturbed condition, typical of systems influenced by the central Queensland agricultural industry. Turbidity levels were considerably higher than the Isaac River, due to finer sediments and adjacent clearing, and metals concentrations were also generally more elevated, likely due to the smaller size of the drainage system resulting in less dilution. Elevated petroleum hydrocarbons were present at the site immediately downstream of Ellensfield Road, and was likely due to the influence of the road and passing vehicles.

Ti-Tree Creek ranked in the poor to moderate categories for bioassessment scores. Few areas had any form of supporting vegetation, and the feature was mostly surrounded by cleared pastureland. Banks were frequently bare, or vegetated by ground layer species only, with few woody stems to provide greater structural support. As with the Isaac River, limited logs, overhangs, pools or boulders, were available to provide habitat for aquatic fauna species or macroinvertebrates. This was also reflected in the relatively few species trapped and limited number of macroinvertebrates observed.

Ti-Tree Creek sites ranked moderately during the condition assessment, generally due to the absence of adjacent vegetation and direct stock access. Floristic biodiversity was low, and sites were recorded as hosting a greater number of introduced species than native species. The waterway, disturbance from clearing, and direct stock access, all contribute to the spread of invasive species.

Similar to worse quality results were recorded for the unnamed tributary, when compared to Ti-Tree Creek.

#### **6.3.6 Relevant Aquatic MNES Identified in the Isaac Downs EIS**

The Isaac Downs EIS aquatic ecology assessment (frc, 2020) provides the following findings relevant to aquatic MNES:

- Comprehensive assessments were undertaken to identify the likelihood of occurrence of the Murray cod, white throated snapping turtle and Fitzroy River turtle.
- White-throated snapping turtle generally inhabits deep (i.e. approximately 6 m) pools during the day and shallow riffles at night, with both of these habitat types absent from the Isaac River in the Isaac Downs Project study area.
- The nearest confirmed records of the white throated snapping turtle and Fitzroy River turtle to the Isaac Downs Project study area (i.e. upper reaches of Tartarus Weir impoundment) are over 180 km (stream distance) downstream from the Isaac Downs Project study area, with records also from the Connors River north of Lotus Creek) over 200 km (stream distance) from the Isaac Downs Project study area. There are no records of these species from the Isaac River upstream of the confluence with the Connors River or in close proximity to the Isaac Downs Project study area.

- The reach of the Isaac River near the Isaac Downs Project study area does not provide suitable habitat (i.e. unsuitable flow regime) for white-throated snapping turtle and Fitzroy River turtle.
- It is likely that the Isaac River at Yatton is the nearest location that has potentially suitable hydrological characteristics for white-throated snapping turtle and Fitzroy River turtle, with this location being some 150 km downstream of the Isaac Downs Project study area.
- The only record of Murray cod in the Fitzroy River Basin (Lake Maraboon, south of the township of Emerald) is over 390 km (stream distance) from the Isaac Downs Project study area. There are no records of this species from the Isaac River, with the absence of records of Murray River cod from the Project study area consistent with the reported habitat preferences of the species (i.e. permanent water). It is considered that the nearest potential locations where Murray cod could occur are the impounded waters of Tartrus Weir, over 180 km (stream distance) downstream from the Isaac Downs Project study area, as the species has been stocked only in impoundments in the Fitzroy River Basin and has not become established in the basin.
- The three aquatic MNES species known from the broader region are highly unlikely to occur in waterways of the Isaac Downs Project study area, with the nearest likely population of all three species (white throated snapping turtle, Fitzroy River turtle and Murray cod), some 150 – 180 km downstream from the Isaac Downs Project study area.

The Isaac Downs Project is located approximately 80 km downstream of the Project along the Isaac River, and therefore the nearest likely population of all three species is approximately 230 – 260 km downstream of the New Lenton Project.

### 6.3.7 Impact Assessment and Mitigation Measures

#### 6.3.7.1 Overview of Potential Impacts

The following Project activities have the potential to impact aquatic ecology, and are therefore considered below:

- Alteration to the hydrology and geomorphology in watercourses and drainage features resulting from:
  - Capture of runoff from mining areas
  - the diversion of Ti-Tree Creek and a levee associated with the diversion
  - a levee along the Isaac River
  - design of the final landform, including waste rock dumps within the Isaac River floodplain
  - crossings of the Isaac River (new bridge for the Suttor Developmental Road realignment and bed level crossing for the ROM coal haul road).
- Uncontrolled release of mine affected water with the potential to impact the water quality of the watercourses within and downstream of the Project area.
- Construction of crossings of the Isaac River.
- Erosion and sedimentation of watercourses within and downstream of the Project area.
- Localised contamination of waterways through accidental release of hydrocarbons or chemicals.
- Spread of aquatic weeds, thereby impacting native vegetation, including riparian vegetation associated with watercourses.

#### 6.3.7.2 Impacts to Hydrology and Geomorphology

Potential Project Impacts on hydrology and geomorphology are described in Section 6.2.4.7. Based on the findings of insignificant to minor changes in hydrology and geomorphology, the Project is unlikely to impact aquatic ecology.



### 6.3.7.3 Release of Mine Affected Water

Section 4.7 of Chapter 4 provides an assessment of the water management system. The water balance model demonstrates that controlled releases are not required as part of the water management strategy due to the balancing of mine affected water with Burton Mine. Furthermore, there were no modelled uncontrolled releases from the Project's mine affected water dams during any of the model realisations over the life of the Project. If mine water releases were to occur they would be in accordance with EA conditions designed to protect downstream environmental values. Therefore management of mine affected water is not predicted to impact aquatic ecology.

### 6.3.7.4 Ti-Tree Creek Diversion

The design of Ti-Tree Creek diversion (see Chapter 4) aims to replicate the geomorphology of the former natural channel of Ti-Tree Creek. Diversion design will include rehabilitation of banks to minimise potential for erosion. However, based on field surveys, Ti-Tree Creek had low aquatic ecology value and no value for MNES listed aquatic species. Therefore the diversion is unlikely to result in direct or indirect impacts to MNES aquatic ecology values.

### 6.3.7.5 Construction of Isaac River Crossings

The Project involves the construction of a new bridge across the Isaac River for the realignment of the Suttor Developmental Road, and a bed level haul road crossing of the Isaac River.

The conceptual design for the bridge crossing is to replicate the existing Suttor Developmental Road bridge crossing, as shown in Figure 6-12.

The conceptual design for the bed level includes:

- aligned perpendicular (within approximately 10°) to the water flow
- the level of the crossing will be at or around the low flow level
- rock chutes downstream of the bed level crossing to control erosion caused by overtopping flows
- stream bed scour protection that abuts the surface edge of the crossing at the same level installed at a gradient similar to the natural channel gradient.

The construction of the crossings will require the clearing of riparian vegetation and excavation of the banks of the River. Banks will be recompacted and shaped, the up and down batters will have geofabric then armour rock placed on them. Rehabilitation of banks will occur once construction is completed. Crossings will preferentially be constructed in the dry season, when the River is dry, to minimise the risk of waterway flows interfering with construction and mobilising sediment.

The following are acceptable solutions when working in or around a watercourse to limit erosion and sedimentation. Any one or a combination of the following will be deployed if and when deemed necessary:

- Limit the activities to the extent necessary by minimising the number of bank cuttings and fills.
- Avoid or limit the removal or destruction of ground cover over areas of water flow.
- Divert water runoff around areas of disturbance.
- Aim to maintain the natural bed and bank profile when constructing or maintaining drainage structures.
- Use bed and bank stabilisation measures such as rock revetment, reinforced matting and large woody debris, log piling or similar.

Construction within watercourses will be undertaken in accordance with requirements of a Riverine Protection Permit if they do not comply with guidelines for Riverine Protection Permit exemption requirements. These are designed to minimise impacts from erosion and sedimentation. Remediation works will be undertaken to minimise bank instability at crossings.

In general, excavation within a watercourse and the development of a crossing can have deleterious impacts on downstream aquatic ecosystems, as well as resident aquatic flora and fauna, due to increases in erosion and sediment transportation. Although erosion and sedimentation from the crossings can potentially give rise to impacts on aquatic ecosystems, the impacts on the ecological values of the Project area are expected to be minor. This is because the Isaac River within the Project area is highly ephemeral, and already experiences high rates of deposition and transportation of sediments during the wet season.

The bed level crossing is unlikely to impact on the aquatic environment through the creation of barriers to fish movement, as River flows will be unimpeded. The design and construction of the crossing will apply the design and construction requirements within the DAF 'Accepted development requirements for operational work that is constructing or raising waterway barrier works' (DAF, 2018) for watercourses to manage impacts to watercourse and fish passage.

Monitoring of water quality, including total suspended solids and turbidity, will be undertaken upstream and downstream of crossing locations during construction, if and when there is water in the Isaac River. Where monitoring indicates that construction of crossings is contributing to an increase in sedimentation, above background levels and natural variability, then construction practices will be amended to reduce sedimentation.

An inspection and maintenance program for crossings will be implemented so infrastructure condition is retained and erosion and sedimentation is minimised.

#### **6.3.7.6 Erosion and Sedimentation**

Although the Project will not impact any MNES listed aquatic species or communities, it is recognised that erosion and sedimentation from mining activities can potentially give rise to impacts on aquatic ecosystems. Drainage of stormwater from the Project area (with elevated levels of suspended sediment) has the potential to affect downstream water quality and sedimentation of waterways, impacting on the downstream aquatic ecological values. The water management plan for the Project (refer to Chapter 4) includes diverting clean runoff from undisturbed areas away from areas disturbed by mining activities, collection of drainage from disturbed areas and directing it to sediment control structures for the control of suspended sediment prior to release from the site.

An erosion and sediment control plan (ESCP) will be implanted for the Project. The ESCP will outline methods and strategies to control soil erosion and minimise sediment transport in accordance with the conditions under the EA and the conceptual water management plan developed for the Project. Adoption of the management measures outlined within the ESCP will limit the potential for adverse impacts to the receiving environment from sediment laden runoff. In addition, a REMP (see Section 6.3.7.9) will be implemented to assess whether there are any long-term impacts from sedimentation to aquatic ecology values within the downstream receiving environment.

#### **6.3.7.7 Spill Management**

Controls will be implemented to prevent accidental release of hydrocarbons or chemicals (See Chapter 4). Spill management procedures will be implemented should there be an accidental release of hydrocarbons or chemicals. Any accidental release of hydrocarbons or chemicals is likely to be localised, with minimal to no impact on the aquatic environment with the implementation of spill management procedures.

#### **6.3.7.8 Weed Management**

The weed and pest animal control measures applicable to the Project will also apply to aquatic weeds and pests.

### 6.3.7.9 Receiving Environment Monitoring Program

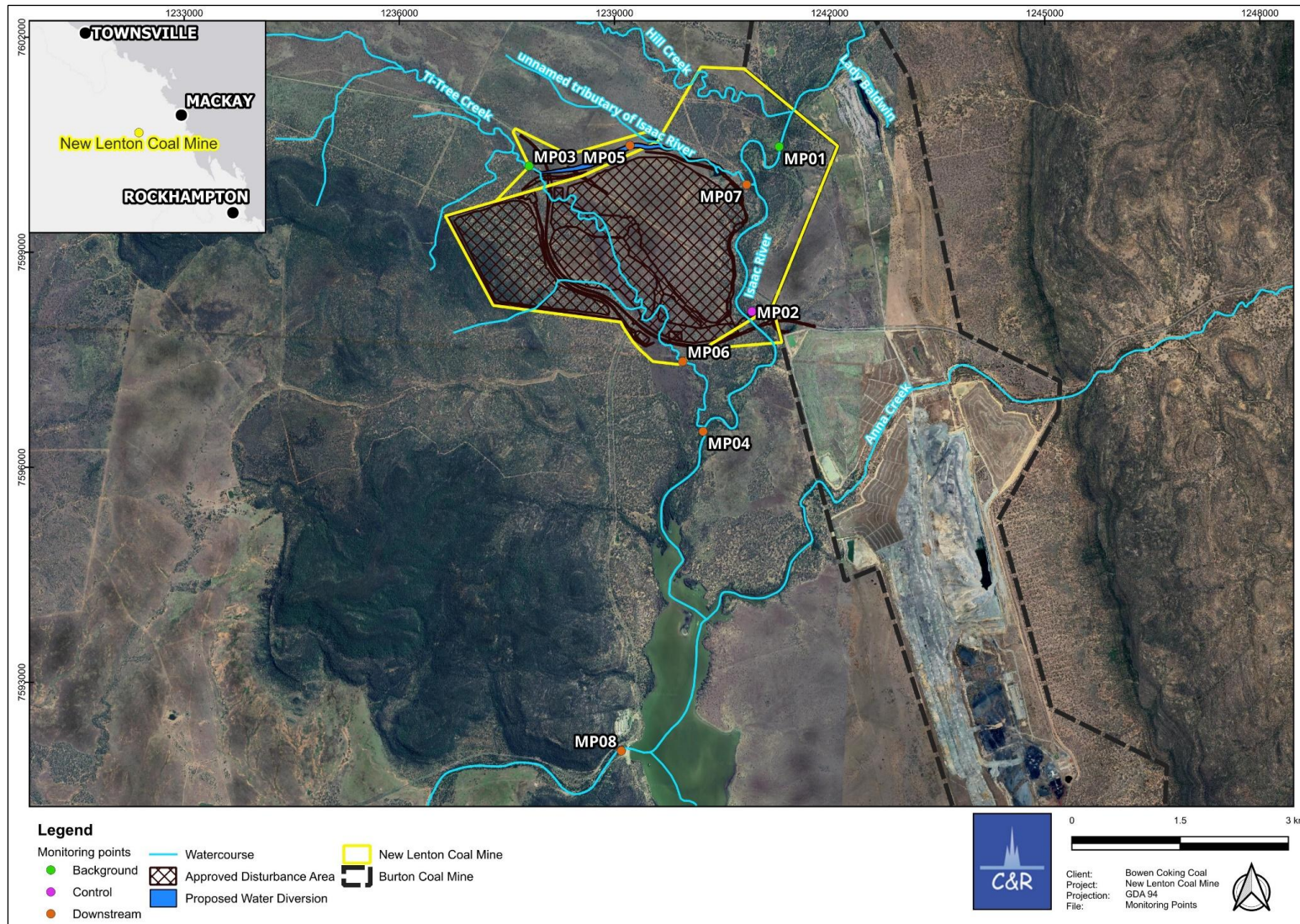
A REMP has been prepared for the Project and is provided as **Appendix 25**. A REMP must be developed and implemented for the Project in accordance with EA Conditions C21 to C23. The REMP includes the upstream and downstream monitoring sites shown in Figure 6-19, inclusive of upstream and downstream monitoring sites on the Isaac River and Ti-Tree Creek (including the diversion).

In accordance with EA Condition C24, the proponent must prepare an annual report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with Conditions C22 and C23, which is provided to DES.

The REMP includes the following:

- a description of the receiving environment during monitoring including baseline condition and climatic conditions
- a description of watercourse levels and / or flows, and any release events during the reporting period
- habitat condition assessment
- setting of specific and measurable objectives for water quality, sediment quality and biological indicators
- water quality sampling for a range of physico-chemical, metals and nutrient parameters
- sediment sampling for particle size and a range of metals parameters
- macroinvertebrate community assessment (e.g. taxonomic richness; PET taxa richness, Stream Invertebrate Grade Number – Average Level (SIGNAL) index; and SIGNAL 2 scores) with statistical analysis
- analysis of data, assessment of trends over time and comparison of data from monitoring sites
- assessment of whether Project activities have impacted the receiving environment
- reporting and corrective actions
- roles and responsibilities.





**Figure 6-19** Draft REMP Monitoring Sites

### 6.3.8 Aquatic Ecology Residual Significant Impact Assessment

No listed aquatic flora or fauna species, nor any aquatic TECs were found in the Project area during the field surveys. The populations of white throated snapping turtle, Fitzroy River turtle and Murray cod are sufficiently displaced from the Project study area to have no risk of direct or indirect impact from the Project. The mitigations described above further reduce any risk of indirect impacts. Therefore no significant impacts to aquatic MNES are predicted as a result of the Project.

## 6.4 Conclusion

Terrestrial and aquatic ecological values were assessed in accordance with the PER Guidelines. The ecological assessments were based on desktop analysis and field surveys undertaken within and surrounding the Project area over a number of years and seasons. Field surveys were undertaken in accordance with Commonwealth and State survey guidelines. Desktop data was used to identify historical records and the status of any listed species and ecosystems, including any changes in the listing status since the time of the controlled action decision.

Terrestrial ecology surveys were completed in the wet season and dry season as part of the assessment for the Project and included targeted habitat assessments for threatened listed species and TECs. These surveys provide a comprehensive assessment of the terrestrial ecological values within and surrounding the Project area. Aquatic ecology surveys have been undertaken as part of the assessment for the Project's State approvals.

The field surveys and desktop data were used to inform the likelihood of occurrence for all potential EPBC Act listed TECs and listed threatened species. Those TECs or species that were known or were likely to occur were considered for assessment of significance of impacts from the Project, being the Poplar Box Grassy Woodland on Alluvial Plains TEC, Greater Glider, Koala, Squatter Pigeon and White-throated Needletail. Mapping of TECs and habitat for listed species was undertaken in accordance with the habitat definitions described in the PER Guidelines, as informed by field surveys.

Aquatic ecology surveys identified that there were no EPBC Act listed aquatic species that are likely to occur within or surrounding the Project area with the nearest likely population of listed aquatic species approximately 230 – 260 km downstream of the Project.

Direct and indirect impacts on the TEC and habitat for listed species was assessed. The Project will result in the clearing of approximately 342.6 ha of remnant and 54.4 ha of regrowth vegetation, whilst 489.2 ha (55.2 %) of the disturbance area will be located in cleared pastureland.

Impacts have been avoided by locating infrastructure within existing cleared areas as far as practical. Mining activities have remained outside of riparian vegetation zone along Isaac River, other than linear infrastructure crossings.

Mitigation measures are proposed to reduce impacts on terrestrial and aquatic ecological values. These include vegetation clearing protocols, weed and pest management plans, erosion and sediment control and rehabilitation of disturbed areas.

Impacts to aquatic ecology values will be mitigated through the construction methods and design of crossings, limiting potential impacts on flows and implementation of the REMP. Based on the lack of listed aquatic species present in the vicinity of the Project, and implementation of the proposed mitigation measures, the Project will not have a significant residual impacts on aquatic MNES.

The significance of impacts on identified EPBC Act listed TECs and habitat for listed species was undertaken in accordance with the Commonwealth Significant Impact Guidelines. Significant residual impacts to MNES were identified for approximately:

- 112.2 ha of Poplar Box Grassy Woodland on Alluvial Plains TEC



- 293 ha of Greater Gilder habitat
- 327 ha of important and suitable Koala habitat
- 192.3 ha of Squatter Pigeon (Southern) habitat.

The total areas of impact cannot be added together as, in some instances, these areas overlap, or an area of land may support multiple MNES.

A Biodiversity Offset Area Management Plan (OAMP) has been developed to offset significant residual impacts for these TEC and species; refer to Chapter 7 and **Appendix 26**.

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