



## **CALLIDE MINE**

### **BOUNDARY HILL SOUTH**

**(EPBC 2012/6324)**

## **OFFSET MANAGEMENT STRATEGY**

**VERSION APPROVED BY DEPARTMENT OF  
ENVIRONMENT AND ENERGY FOR PUBLIC  
EXHIBITION**

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## GLOSSARY

| Term               | Definition  |
|--------------------|---|
| Biodiversity       | The diversity of different species of plants, animals and micro-organisms, including the genes they contain.  |
| Bioregion          | Relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems.   |
| Ephemeral          | A watercourse, with defined bed and banks, which flows only intermittently after rain.  |
| Habitat            | The native environment where a given animal or plant lives or grows, often described in terms of geography, climate and vegetation.   |
| Harp trap          | A device used to capture bats without exposing them to disentangling from traps like mist nets and hand nets. It capitalizes on bats' flight characteristic of turning perpendicular to the ground to pass between obstacles, in this case the trap's strings, in which flight attitude they cannot maintain their angle of flight and drop unharmed into a collection chamber.                               |
| Mitigation         | The act of lessening in intensity, to prevent or make less severe.  |
| Open cut mine      | Process used to remove minerals found over a large area, close to the surface. The mine is dug downward in benches or steps.  |
| Product coal       | Coal that has been processed in a coal processing plant, ready for export to market.  |
| Regional ecosystem | A vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil.  |
| Remnant vegetation | Native vegetation remaining after an area has otherwise been cleared.   |
| Watercourse        | Under the <i>Water Act 2000</i> , a watercourse is defined as a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events—<br>(a) in a natural channel, whether artificially modified or not; or<br>(b) in an artificial channel that has changed the course of the stream. |

## **BOUNDARY HILL SOUTH OFFSET MANAGEMENT STRATEGY**

*for*  
**Batchfire Resources Pty Ltd**

### **1 INTRODUCTION**

Hansen Bailey was commissioned by Batchfire Resources Pty Ltd (Batchfire) (the proponent) to prepare an Offset Management Strategy for the Boundary Hill South Project (the project). The project received approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2012/6324) on 24 March 2017. This Offset Management Strategy has been developed in accordance with the requirements of EPBC Act Approval (2012/6324) conditions 4 and 5.

#### **1.1 BACKGROUND**

Callide Mine is located approximately 20 km north of Biloela in Central Queensland. Callide Mine is an open cut coal mine with an annual production rate of approximately 10.5 Million tonnes per annum of product coal. Mining commenced at Callide Mine in 1944. The mine produces low-sulphur, sub-bituminous thermal coal that is predominantly used to supply Queensland's domestic power demands via the adjacent Callide Power Station.

Callide Mine involves open cut mining in four discrete mining areas (Figure 1). Open cut mining at the Boundary Hill mining area commenced in 1983. Boundary Hill operates independently of the other Callide Mine mining areas. The Boundary Hill South Project is an extension of the Boundary Hill mining area (Figure 1). Coal mining at the Boundary Hill South pit is due to commence in June 2018.

#### **1.2 PURPOSE AND STRUCTURE OF THIS REPORT**

The EPBC Act approval requires offsets for the Squatter Pigeon (southern) and the Koala, and potentially the South-eastern Long-eared Bat.

This Offset Management Strategy has been prepared in accordance with EPBC Act approval (EPBC 2012/6324) conditions 4 and 5. Table 1 indicates where the specific requirements of each condition are addressed in this Offset Management Strategy.

**Table 1**  
**EPBC Act Approval Conditions Relevant to this Offset Management Strategy**

| Condition  | Section Number   |
|--|--|
| <p><b>Offsets</b></p> <p>4. The <b>approval holder</b> must submit an Offset Management Strategy for the <b>Minister's</b> written approval for the loss of the following:</p> <ul style="list-style-type: none"> <li>• 266 hectares of Squatter Pigeon habitat;</li> <li>• 257 hectares of Koala habitat; and</li> <li>• 224 hectares of South-eastern Long-eared Bat habitat if the harp trap survey required at conditions 2 and 3 determines that the species is present in the project site.</li> </ul> | <p>Section 3.1</p> <p>Section 3.1</p> <p>Section 3.3</p> |
| <p>5. The Offset Management Strategy must include, but not be limited to:</p> <p>(a) The proposed timeline and legal mechanism for securing the offset areas or offset outcomes;</p> <p>(b) Details of minimum offset area/s;</p> <p>(c) Evidence that the offset/s are in accordance with the EPBC Act Environmental Offsets Policy.</p>  | <p>Section 4.3</p> <p>Section 3.4</p> <p>Section 2.2</p> |

This document has been structured as follows:

- Section 1 (this section) provides an overview of the project and details the scope of the report;
- Section 2 describes the legislative framework in regards to offset requirements;
- Section 3 provides a summary of the offset requirements for the project that have been identified;
- Section 4 outlines the process to be delivering the offsets;
- Section 5 provides details required for a potential offset property;
- Section 6 presents the conclusions from this report; and
- Section 7 lists the references cited in this report.

## 2 LEGISLATIVE FRAMEWORK

### 2.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT

The EPBC Act is the Commonwealth Government's principal piece of environmental legislation, and is administered by the Department of the Environment and Energy (DoEE). It is designed to protect Matters of National Environmental Significance (MNES), including threatened flora and fauna species.

Any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES is termed a controlled action and is subject to assessment under the EPBC Act.

The project was approved under the EPBC Act (EPBC 2012/6324) on 24 March 2017.

### 2.2 EPBC ACT ENVIRONMENTAL OFFSETS POLICY

The *EPBC Act Environmental Offsets Policy* (EPBC Act Offsets Policy) provides guidance on the role of offsets in environmental impact assessments. The EPBC Act Offsets Policy sets out the requirements for offsets to compensate for significant, residual impacts on MNES.

The EPBC Act Offsets Policy relates to all protected matters under the EPBC Act and has five key aims:

- To ensure the efficient, effective, timely, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act;
- To provide proponents, the community and other stakeholders with greater certainty and guidance on how offsets are determined and when they may be considered under the EPBC Act;
- To deliver improved environmental outcomes by consistently applying the policy;
- To outline the appropriate nature and scale of offsets and how they are determined; and
- To provide guidance on acceptable delivery mechanisms for offsets.

The EPBC Act Offsets Policy acknowledges that avoidance and mitigation measures are still the primary strategies for managing the potential impact of a proposed action. The focus of an offset is to compensate for any significant, residual impact after avoidance and mitigation steps have been taken.

According to the EPBC Act Offsets Policy, an offsets package is a “*suite of actions that a proponent undertakes in order to compensate for the residual significant impact of a project*” (SEWPaC, 2012). It can comprise a combination of direct offsets and other compensatory measures.

Direct offsets (generally land based offsets) are those actions that provide a measurable conservation gain for an impacted protected matter. Direct offsets are an essential component of a suitable offsets package. A minimum of 90% of the offset requirements for any given impact must be met through direct offsets. Other compensatory measures are those actions that do not directly offset the impacts on the protected matter, but are anticipated to lead to benefits for the impacted protected matter, for example funding for research or educational programs (SEWPaC, 2012).

The EPBC Act Offsets Assessments Guide has been developed to provide guidance on the suitability of the proposed offsets and the size of the offset required. Use of the calculator requires detailed information about the quality of the vegetation in the area to be impacted and in the proposed offset area. Further information on the Guide is presented in Section 3.4.

Table 2 provides a high level description of the consistency of the biodiversity offsets proposed for the project with the requirements of the EPBC Act Offsets Policy. It includes cross references to the sections in this report that address the requirements of the EPBC Act Offsets Policy. Condition 5(c) of the EPBC Act approval for the project reflects a requirement for environmental offsets to comply with the requirements of the EPBC Act Offsets Policy.

**Table 2**  
**Consistency of Project Offsets with EPBC Act Offsets Policy**

| Requirement of EPBC Act Offsets Policy  | Proposed Project Offsets  |
|---|---|
| Offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter | Delivering an overall conservation outcome to protect or maintain the viability of the protected matter (i.e. Squatter Pigeon (southern) and Koala) is inherent to the design of the offsets program. The offsets property will provide additional areas of habitat for the protected matters in accordance with the EPBC Act Offsets Policy and Guide, with the offset areas to be managed for conservation purposes in the long term.   |
| Suitable offsets must be built around direct offsets but may include other compensatory measures                      | As noted in Section 4.2, direct, land based offsets are proposed to be provided. This Offset Management Strategy does not have any reliance on other compensatory measures.   |
| Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter      | The Guide determines the required offset area based on a range of parameters, including the level of statutory protection. This will ensure that the offset areas are in proportion to the level of statutory protection that applies to the protected matter, and is discussed in detail in Section 4.3.   |
| Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter            | As noted above, the Guide will be used to determine the size of the offset area. The Guide takes into account a range of factors in determining the size of the offset area, including the size of the area that will be impacted (and hence is required to be offset). This will ensure that offsets are of a size and scale proportionate to the residual impacts on the protected matter. Preliminary estimated offset requirements have been used to measure the adequacy of any potential offset property, as discussed in Sections 3.1 and 3.4. |



| Requirement of EPBC Act Offsets Policy   | Proposed Project Offsets  |
|--|---|
| Suitable offsets must effectively account for and manage the risks of the offset not succeeding  | As noted in Section 4.2, the Offset Management Plan will include “A description of the potential risks to the successful implementation of the plan, and a description of the contingency measures that would be implemented to mitigate against these risks”. This provision will manage any risk of the offset not succeeding.  |
| Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs | The proposed offsets will be beyond existing requirements.  |
| Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable   | As noted in Section 4.2, the Offset Management Plan will describe the performance and completion criteria for the offsets, as well as provide a detailed description of the management measures to be implemented. It will also include detail of a monitoring and reporting program. These measures are designed to ensure that offsets are efficient, effective, timely, transparent, scientifically robust and reasonable. |
| Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and reported.             | As noted in Section 4.2, the Offset Management Plan will describe “A program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria”. This will meet the requirements of the EPBC Act Offsets Policy in terms of monitoring, auditing and reporting.  |

### 2.3 EPBC ACT OFFSETS ASSESSMENT GUIDE

The EPBC Act Offsets Policy is accompanied by the *Offsets Assessment Guide* (EPBC Act Offsets Guide). The EPBC Act Offsets Guide is a detailed calculator that has been developed in order to provide proponents with an estimate of offset requirements for a project, based on a number of environmental attributes of both the impacted area and the offset property.

The information provided in this Strategy, along with the EPBC Act Offsets Guide, has been used by Batchfire Resources to provide a preliminary assessment of the suitability for any proposed offset property in accordance with the EPBC Act Environmental Offsets Policy.

### 3 PROJECT OFFSET REQUIREMENTS

#### 3.1 REQUIRED OFFSETS

The EPBC Act approval requires offsets for the Squatter Pigeon (southern) and the Koala. Table 3 provides a summary of the offset requirements for these species.

**Table 3**  
**Project Offset Requirements**

| MNES   | EPBC Act Status | Total Habitat Area within Project Site (ha) | Total Impacted Habitat Area within Project Site (ha) | Conservative Estimate of Maximum Project Offset Requirements (ha)* |
|--|-----------------|---|--|--|
| Squatter Pigeon (southern) ( <i>Geophaps scripta scripta</i> ) | Vulnerable      | 395   | 266  | 1,538  |
| Koala ( <i>Phascolarctos cinereus</i> )                        | Vulnerable      | 292   | 257  | 1,486  |

The offset requirements for the loss of Koala and Squatter Pigeon (southern) habitat are based on the following inputs to the guide:

- 0% risk of loss of the offset with and without offset. This is because there are no threats to the proposed offset area of total loss of habitat values, such as from mining, residential development or intensive cultivation/cropping. Also, in the event of approved development the offset values of the project site and the offset area can be expected to be offset;
- Very high percent confidence in the risk of loss; and
- There is unlikely to be a loss of habitat condition through the continuation of current management practices at the offset site;

A conservative estimate of maximum potential offset requirements have been developed by assuming improvement in offset condition of one condition class over a 20 year time to ecological benefit, and a high confidence in attainment of this future condition.

#### 3.2 PROJECT SITE PRELIMINARY HABITAT QUALITY ASSESSMENT

##### 3.2.1 Methodology

Assessment units within the project site were chosen and habitat quality assessment plots within these units were then undertaken in accordance with the DoEE accepted *Guide to determining terrestrial habitat quality* (Department of Environment and Heritage Protection

(EHP, 2017). The habitat quality assessment included the collection of data to measure 13 ecological condition indicators.

Each habitat quality assessment plot was measured for the following attributes:

- Location of the plot (GPS);
- Date of survey;
- Orientation of the plot;
- Climatic conditions;
- Soils, slope, aspect and landform observations;
- 100 m transect:
  - Tree canopy cover;
  - Tree sub-canopy cover; and
  - Native shrub cover.
- 100 x 50 m plot:
  - Number of large Eucalypt trees;
  - Number of large non-Eucalypt trees;
  - Tree canopy height – median canopy height;
  - Recruitment of canopy species – proportion of dominant canopy species that are regenerating; and
  - Native tree species richness – number of species present.
- 50 m x 20 m plot:
  - Coarse woody debris – length of all logs > 10 cm diameter and 0.5 m in length.
- 50 m x 10 m plot
  - Native shrub, grass and forbs/other species richness; and
  - Non-native plant cover – cover of exotic species as a component of the overall vegetation cover.
- 1 m x 1 m quadrats:
  - Native perennial grass cover;
  - Organic litter cover;
  - Native forbs and other species;
  - Native shrubs (<1 m in height);
  - Non-native grass; and
  - Non-native forbs and shrubs.

Landscape context of the project site was also measured. In accordance with the *Guide to determining terrestrial habitat quality* (EHP, 2017), the project site is located in a fragmented landscape.

The habitat quality assessment was undertaken by suitably qualified and experienced persons of Ecological Survey & Management.

The same methodology will be used to determine the habitat quality assessment within any potential offset property, in accordance with the *Guide to determining terrestrial habitat quality* (EHP, 2017).

### 3.2.2 Preliminary Habitat Quality Assessment

A total of nine habitat quality assessment plots were undertaken within the project site, in both remnant and non-remnant vegetation areas. Overall ecological condition within the project site was found to be good to poor, with low to moderate degrees of weed infiltration, and adequate canopy recruitment and species richness in areas of good condition, through to marked weed infiltration, low levels of coarse woody debris and low species richness and diversity with the absence of large trees in areas of poor condition. Preliminary habitat quality scores for each of the assessment units for the Squatter Pigeon and the Koala are provided in the following tables.

**Table 4**  
**Preliminary Habitat Quality Scores – Squatter Pigeon**

| Parameters                   | Assessment Unit |             |           |           |             |           |           |             |             |
|------------------------------|-----------------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-------------|
|                              | 1               |             | 2         |           | 3           |           |           | 4           |             |
| Polygons                     | 1               | 2           | 3, 4      |           | 9           | 5, 7, 8   | 6         |             | 10, 11      |
| Area (ha)                    | 39.3            | 33          | 67.9      |           | 66.8        | 39.6      | 46.4      |             | 57.2        |
| RE                           | 11.9.9          |             | 11.10.1   |           | HVR 11.9.9  |           |           | HVR 11.10.1 |             |
| BVG                          | 13c             |             | 10a       |           | 13c         |           |           | 10a         |             |
| Habitat Quality Score Site   | 6               | 9           | 1         | 3         | 2           | 5         | 7         | 8           | 4           |
| Site Condition Score         | 53              | 50.5        | 49        | 49        | 43.5        | 46        | 56        | 40.5        | 39.5        |
| Site Context Score           | 13              | 13          | 11        | 14        | 11          | 11        | 14        | 14          | 14          |
| Species Habitat Index        | 25              | 28          | 36        | 28        | 36          | 28        | 21        | 28          | 21          |
| <b>Habitat Quality Score</b> | <b>91</b>       | <b>91.5</b> | <b>96</b> | <b>91</b> | <b>90.5</b> | <b>85</b> | <b>91</b> | <b>82.5</b> | <b>74.5</b> |

**Table 5**  
**Preliminary Habitat Quality Scores – Koala**

| Parameters                   | Assessment Unit |             |              |    |             |           |           |             |              |
|------------------------------|-----------------|-------------|--------------|----|-------------|-----------|-----------|-------------|--------------|
|                              | 1               |             | 2            |    | 3           |           |           | 4           |              |
| Polygons                     | 1               | 2           | 3, 4         |    | 9           | 5, 7, 8   | 6         |             | 10, 11       |
| Area (ha)                    | 39.3            | 33          | 67.9         |    | 66.8        | 39.6      | 46.4      |             | 57.2         |
| RE                           | 11.9.9          |             | 11.10.1      |    | HVR 11.9.9  |           |           | HVR 11.10.1 |              |
| BVG                          | 13c             |             | 10a          |    | 13c         |           |           | 10a         |              |
| Habitat Quality Score Site   | 6               | 9           | 1            | 3  | 2           | 5         | 7         | 8           | 4            |
| Site Condition Score         | 53              | 50.5        | 49           | 49 | 43.5        | 46        | 56        | 40.5        | 39.5         |
| Site Context Score           | 13              | 13          | 11           | 14 | 11          | 11        | 14        | 14          | 14           |
| Species Habitat Index        | 21              | 25          | Not Required |    | 33          | 25        | 25        | 17          | Not Required |
| <b>Habitat Quality Score</b> | <b>87</b>       | <b>88.5</b> | <b>N/A</b>   |    | <b>87.5</b> | <b>82</b> | <b>95</b> | <b>71.5</b> | <b>N/A</b>   |

### 3.3 SOUTH-EASTERN LONG-EARED BAT

In accordance with EPBC Act approval (EPBC 2012/6324) conditions 2 and 3, a targeted survey was undertaken for the South-eastern Long-eared Bat to determine its presence within the project site. The methodology and results of the survey are provided in Appendix A. EPBC Act approval (EPBC 2012/6324) conditions 2 and 3 are as follows:

- Condition 2  
 The approval holder must undertake a harp trap survey for the South-eastern Long-eared bat (*Nyctophilus corbeni*) prior to **commencement** of the action. The harp trapping must be done in accordance with harp trapping requirements of the **EPBC Act survey guidelines**.
- Condition 3  
 If the harp trap survey determines the presence of a South-eastern Long-eared Bat on the project site, the approval holder must provide an offset for the loss of its habitat on the project site.

As discussed in Appendix A, South-eastern Long-eared Bats were not identified during the targeted survey. As such, offsets for the species are not required.

### **3.4 ESTIMATE OF REQUIRED OFFSET AREA**

The EPBC Act Offsets Assessment Guide has been developed by DoEE to provide guidance on the suitability of the proposed offsets and size of offset required. Use of the calculator requires detailed information about the quality of the vegetation in the proposed offset area, and this information will only be available following a field survey of the proposed offset property. The Guide will be used to confirm the size of the required offset once the proposed offset property has been accessed and the property adequately surveyed.

## **4 DELIVERY OF OFFSETS**

### **4.1 INTRODUCTION**

This section describes the approach that will be adopted for providing offsets. Section 4.2 describes the Offset Management Plan that will be prepared for the project, while Section 4.3 describes the mechanisms that will be used to legally secure offsets. The surveys proposed to be undertaken within the proposed offset property; the management of offsets, and the monitoring and reporting that will occur within the proposed offset property are described in Sections 4.4 to 4.6, respectively.

A revised Offset Management Strategy will be provided to DoEE for approval following completion of habitat quality assessment field surveys of the proposed offset property, and prior to submitting the draft Offset Management Plan for approval. As part of reviewing and approving the revised Strategy, the DoEE will apply the Guide to confirm the required offset area based on detailed survey information.

### **4.2 OFFSET MANAGEMENT PLAN**

Section 5 outlines the requirements for any of the proposed offset properties identified. There is still further survey work to be undertaken on potential properties to characterise vegetation condition and identify suitable management measures. Consistent with condition 7 of the EPBC Act approval (EPBC 2012/6324), this future work will be documented in a revised Offset Management Strategy and an Offset Management Plan and submitted to DoEE for written approval. Offsets will be designed to meet the requirements of the EPBC Act Offsets Policy, and the Offset Management Plan will describe the way in which offsets are consistent with the policy.

The Offset Management Plan will include details such as:

- A detailed baseline description of offset areas, including surveys undertaken and condition of habitat for the Squatter Pigeon (southern) and Koala;
- The way in which the offset areas provide connectivity with other habitats and biodiversity corridors;
- Performance and completion criteria for evaluating the management of the offset area, and criteria for triggering remedial action (if necessary);
- A description of the management measures that will be implemented for the protection of the Squatter Pigeon (southern) and Koala and their habitat, including a discussion of how measures proposed are consistent with the measures in relevant conservation advice, recovery plans and threat abatement plans. This will include an implementation schedule and other reporting schedules and tables, as necessary;
- A program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;
- A description of the potential risks to the successful implementation of the plan, and a description of the contingency measures that would be implemented to mitigate against these risks. This will include confidence levels for time until the ecological benefit vs risk of loss;
- A schedule of conservation commitments required to establish and manage the offset areas; and
- A timeline for when actions identified in the Offset Management Plan will be implemented for the offset area and the proposed legal mechanism for securing the offset.

A high level overview of the mechanism to secure offsets; field surveys; management measures; and monitoring and reporting of offset property are provided in the following sections, with further detail to be provided in the Offset Management Plan.

In accordance with condition 7(g) of the EPBC Act Approval, the project offsets will be legally secured within two years of the approval of this Offset Management Strategy.

#### **4.3 MECHANISM TO LEGALLY SECURE OFFSETS**

As a general guide, the best legal mechanisms for protecting land are mechanisms that are intended to be permanent (lasting forever) and are secure (that is, they are difficult to change or alter) (SEWPaC, 2012). These two elements are important because they mean that land set aside as an offset will continue to provide a secure benefit to the impacted protected matter.

Legal mechanisms, such as conservation covenants and voluntary declarations, exist in each state and territory to enable the protection of land that is set aside for environmental purposes on a permanent or long-term basis.

All direct offset sites will be secured using one of the legally binding mechanisms that are available in Queensland, such as a conservation covenant or a voluntary declaration, to ensure the protection of the offset and implementation of the Offset Management Plan. Legally binding mechanisms relevant to Queensland are detailed in the *Environmental Offsets Act 2014* and include an area of land that is either an environmental offset protection area, an area of high nature conservation value under the Queensland *Vegetation Management Act 1999* or another area prescribed under regulation. However, the area is only a legally secured offset area if the area is subject to a delivery or management plan or agreement (however described) to achieve a conservation outcome.

Batchfire's preferred mechanism for legally securing the offset property is by voluntary declaration. However, the legal mechanism will need to be approved by the landowner of any potential offset areas.

The indicative timeframe for achieving the legally secured offset is as follows:

- Target for completion of initial landowner negotiations – December 2018.
- Completion of offset property field surveys – October 2019.
- Target for completion of final landowner offset negotiations – December 2019.
- Completion of the revised Offset Management Strategy – December 2019.
- Completion of the Offset Management Plan and legally secured offset mechanism – June 2020.

#### **4.4 DETAILED FIELD SURVEYS**

Detailed field surveys of the proposed offset property are required to be undertaken to characterise the quality of the vegetation and habitat, and to identify potential management strategies. These field surveys can only be undertaken once the proponent has entered into formal access agreements with the relevant third party landowner. The field surveys are proposed to be undertaken once approval under the EPBC Act has been obtained for this Offset Management Strategy. Field surveys will be undertaken in accordance with relevant Federal and State guidelines, and will be undertaken by a suitably qualified ecologist. The field survey results will be documented in the Offset Management Plan (Section 4.2).



#### **4.5 MANAGEMENT OF OFFSETS**

The management of offsets will be detailed in the Offset Management Plan. Offsets will be managed using methods such as:

- Management of grazing to achieve conservation outcomes;
- Exclusion of cultivation;
- Weed and pest management;
- Fire management; and
- Detailed monitoring and reporting.

Further detail on management measures will be provided in the Offset Management Plan.

#### **4.6 MONITORING AND REPORTING**

Regular monitoring and reporting on the progress of the offset area/s will be provided to DoEE. The Offset Management Plan will describe the proposed monitoring and reporting program. It is anticipated that photo-point monitoring and vegetation assessments will be conducted as a component of the monitoring and reporting requirements. Reporting on the management of fire and monitoring for pests and weeds will be conducted with the assistance of the land manager. The monitoring program will also include activities to detect management triggers, and will describe how monitoring activities may inform the selection and implementation of corrective actions.

## 5 PROPOSED OFFSET PROPERTIES

### 5.1 INTRODUCTION

To demonstrate the availability of offsets, the proponent will identify properties that are likely to contain adequate offsets, having regard for the conservative estimate of offset requirements for the residual impact.

The proposed offset properties:

- Will be located within the Brigalow Belt Bioregion (the same bioregion as the project);
- Will contain remnant vegetation (based on published Queensland Regional Ecosystem (RE) mapping); and
- Will be identified through the EPBC Act Protected Matters Search Tool as being in areas where Squatter Pigeon (southern) and Koala habitat is known or likely to occur.

### 5.2 HABITAT MODELLING METHODOLOGY

The definitions of suitable habitat for the Squatter Pigeon (southern) and Koala are based on the DoEE's Species Profile and Threats Database (SPRAT) profile for each species, as follows:

#### Squatter Pigeon (southern)

- Open-forests to sparse, open-woodlands and scrub that are:
  - Dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species;
  - Remnant, regrowth or partly modified vegetation communities; and
  - Within 3 km of water bodies or watercourses. Note that the water body must be within land zones 3, 4, 5, 7, or 10.
- Any forest/woodland occurring between patches of foraging or breeding habitat and suitable waterbodies/courses but not suitable for foraging/breeding. However, the distance of cleared land between remnant trees/habitat patches is no more than 100 m.

#### Koala

- Any forest or woodland containing species that are Koala food trees, or any shrubland with emergent Koala food trees (i.e., trees of any of the following genera: *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon*, *Melaleuca*).

These definitions were used in locating the habitat for these species on the offset property. The habitat modelling for the offset property was based on recent government mapping and field inspections, and included mapping of vegetation, land zones and watercourses, given these elements denote potential habitat for the Squatter Pigeon (southern) and Koala. The

available habitat on these properties will be confirmed when detailed field surveys are undertaken for the Offset Management Plan.

## 6 CONCLUSION

The proponent will seek to enter into formal discussions with any property owner identified for the potential use of the land for offsets, in order to confirm the landowner's interest in the establishment of offsets, and agreement to undertake field surveys. This will enable preparation of the revised Offset Management Strategy, and the Offset Management Plan in accordance with condition 7 of the EPBC Act approval.

The Offset Management Plan will include details of the management methods that will be put in place for the offset properties to achieve appropriate conservation outcomes, such as the management of grazing pressure, pests, weeds and fire. The Offset Management Plan will also describe the agreed monitoring and reporting procedures for the offset property to ensure regulatory compliance.

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## Declaration of accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this EPBC Act Offset Management Strategy is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the approval holder.
3. I am aware that:
  - a. Section 490 of the EPBC Act makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
  - b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* where the person knows the information or document is false or misleading.
  - c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed



Jeff Beatty

Manager – Technical Services & Environment and Community

Batchfire Resources Pty Ltd

24 July 2018

\*

\*

\*

for  
**HANSEN BAILEY**



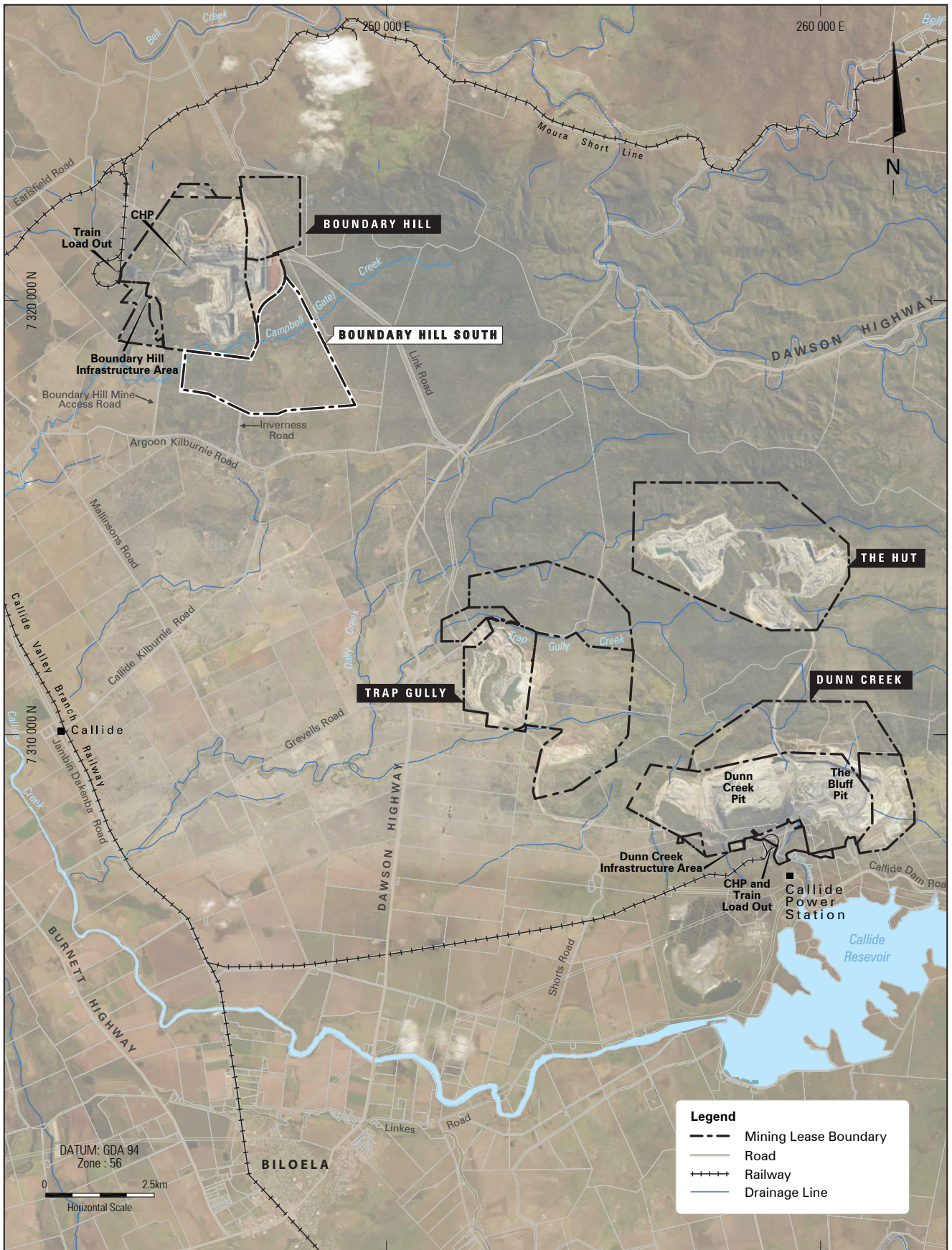
Chloe Annandale  
*Environmental Scientist*



Peter Hansen  
*Director*

## **FIGURES**







## **APPENDIX A**

### ***Boundary Hill South South-eastern Long-eared Bat Report***

**BOUNDARY HILL SOUTH PROJECT**

**South-eastern Long-eared Bat Report**

For:

**Hansen Bailey**

June 2018

**Final**



**PO Box 2474  
Carlingford Court 2118**

**Report No. Q14007RP2**

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The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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| Version | Date Issued   | Amended by | Details                               |
|---------|---------------|------------|---------------------------------------|
| 1       | 26 April 2018 |            | Final                                 |
| 2       | 7 June 2018   | K. Wolf    | Amended following DoEE review. Final. |
|         |               |            |                                       |
|         |               |            |                                       |
|         |               |            |                                       |
|         |               |            |                                       |

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Approved by: Dr. David Robertson

Position: Director

Signed: 

Date: 7 June, 2018

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# Glossary of Terms

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|              |   |
|--------------|---|
| DoEE         | Commonwealth Department of the Environment and Energy                             |
| EPBC Act     | Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| ML           | Mining Lease  |
| RE           | Regional Ecosystem  |
| project site | Mining Lease 80186  |
| the Project  | The Boundary Hill South Project   |

## Introduction

---

In accordance with conditions 2 and 3 of the Boundary Hill South EPBC Act approval (EPBC 2012/6324), a harp trap survey was undertaken on the Boundary Hill South project site for the South-eastern Long-eared Bat by Cumberland Ecology. The relevant EPBC Act approval conditions are as follows:

### ***Pre-clearance surveys***

*2. The approval holder must undertake a harp trap survey for the South-eastern Long-eared bat (Nyctophilus corbeni) prior to commencement of the action. The harp trapping must be done in accordance with harp trapping requirements of the EPBC Act survey guidelines.*

*3. If the harp trap survey determines the presence of a South-eastern Long-eared Bat on the project site, the approval holder must provide an offset for the loss of its habitat on the project site.*

The purpose of this report is to describe the field survey methodology and survey effort undertaken for the South-eastern Long-eared Bat within the project site (see **Figure 1**) and to confirm whether the species is present.

The harp trap survey undertaken took into consideration the findings of the Terrestrial Ecology Report prepared by Cumberland Ecology in 2015 for the Boundary Hill South Environmental Impact Statement approval. Habitat modelling for the South-eastern Long-eared Bat undertaken by Cumberland Ecology (2015) indicated the following:

- No high value habitat occurs in the project site as there is no verified habitat where the species has been found and, due to the extensive disturbance via clearing and cattle grazing that has occurred to the woodlands of the project site;
- 347.3 ha of low value habitat occurs in woodland in the northern, eastern and western portions of the project site where suitable foraging habitat is present; and
- 271.4 ha of unsuitable habitat occurs in the remainder of the project site and is characterised by heavily modified woodlands and grasslands.

# Methodology

---

## 2.1 Literature and Database Review

Key documents and data reviewed for this assessment include:

- Commonwealth *Survey Guidelines for Australia's Threatened Bats* (DEWHA, 2010) (the 'survey guidelines'), including species specific information for the South-eastern Long-eared Bat and general bat survey information;
- *Approved Conservation Advice for Nyctophilus corbeni (south-eastern long-eared bat)* (Threatened Species Scientific Committee, 2015), including species habitat information;
- Queensland Wildlife Online database (EHP, 2017), accessed prior to surveys on 11 April 2017 covering an area of a 50 km radius around the centre of the project site;
- Queensland Wildlife Online database (EHP, 2018), accessed post surveys on 5 June 2018 covering an area of a 50 km and 100 km radius around the centre of the project site;
- Cumberland Ecology (2015) Boundary Hill South Project – Terrestrial Ecology Report;
- AECOM (2012) Boundary Hill South - Terrestrial Fauna Technical Report.
- Regional ecosystem (RE) mapping developed by the QLD Herbarium which was provided during the Project's assessment process (Version 9.0); and
- Aerial photographs of the project site to examine vegetation patterns, water sources and access routes.

The information collected during the literature and data review guided the field surveys undertaken for this assessment, specifically the locations and survey effort.



## 2.2 Field Surveys

### 2.2.1 Survey Approach

The recommended survey approach within the survey guidelines for the South-eastern Long-eared Bat includes:

1. *Prior to the survey. In agricultural or other heavily modified landscapes, digital aerial photography of the study area can be examined to determine the size and pattern of vegetation remnants so that trapping effort can be planned.*
2. *Passive acoustic detection. Bat detectors can be used to identify areas used by long-eared bats, even if they cannot be identified to species level. Acoustic detection can then be followed up with an appropriate level of trapping.*
3. *Trapping. Mistnets and harp traps should be placed in woodland, mallee and forest, given that the species forages below the tree canopy, often to ground level. Equipment should be placed both in open fly-ways and within cluttered vegetation. If open water bodies (earth dams, fire dams, open top tanks and watercourses) occur in or near the project area, then significant effort should be given to mist-netting or harp trapping over the water. For project sites where there is no surface water, mistnets can be set over temporary water pools specifically constructed for the purpose of the survey.*

Prior to the harp trapping survey being undertaken within the project site, Cumberland Ecology undertook a literature and database review to guide field survey locations and effort. This included review of aerial imagery and vegetation mapping and consideration of size and patterns of remnant vegetation.

The conditions of the Boundary Hill South EPBC Act approval (EPBC 2012/6324) did not require passive acoustic detection; therefore this survey method was not undertaken as part of the field survey. However consideration was given to the location of records of calls from the *Nyctophilus* genus detected during surveys by AECOM (2012). Of the three locations surveyed by AECOM (2012) with calls from the *Nyctophilus* genus, only one occurs within the project site. Consideration was given to this location and one harp trap (HT3) was positioned in the vicinity of this location.

As specified by the conditions of the Boundary Hill South EPBC Act approval (EPBC 2012/6324), a field survey using harp trapping techniques was undertaken within the project site. As the conditions did not require use of mist nets, this survey method was not undertaken as part of the field survey.

The survey guidelines recommend a total of 20 harp trap nights (over five nights) for areas <50 ha. Due the size of the project site and required timeframe for surveys, it was considered that a comprehensive search of the entire area was not feasible at the survey effort levels outlined within survey guidelines (i.e. 20 trap nights per 50 ha), therefore selective sampling was proposed. As outlined within the survey guidelines, an effective

strategy to maximise the likelihood of detection a particular species is to concentrate survey effort within habitat that is favoured by the targeted species.

Cumberland Ecology (2015) previously mapped only low value habitat and unsuitable habitat for this species within the project site. The approach undertaken in this assessment was to conduct selective spatial sampling at 10 sites within areas previously mapped as comprising low value habitat. Areas previously mapped as comprising unsuitable habitat were excluded from field surveys. To determine suitable locations for the trap sites within mapped low value habitat, Cumberland Ecology reviewed the habitat requirements of the South-eastern Long-eared Bat in conjunction with a review of the Regional Ecosystem (RE) mapping to determine suitable locations of harp trapping sites. The trap sites were selected to primarily focus on woodland and forest REs (11.3.25, 11.8.4, 11.9.9 11.9.13/11.10.1 and 11.10.1), with limited sampling in non-remnant vegetation. This is due to the species favouring habitats with a distinct tree canopy and dense cluttered understorey.

Eight harp trap sites were located within woodland and forest REs, including one in proximity to a dam. The remaining two harp trap sites were located within non-remnant vegetation in proximity to a dam and a seasonal wetland.

The survey guidelines recommend surveys for the South-eastern Long-eared Bat are undertaken between October and April throughout Australia. As such, the surveys were designed to occur during this recommended period and were undertaken during April 2017.

### 2.2.2 Survey Methods

Harp traps were established at 10 sites within the project site on 24 April 2017. The locations of these harp traps are shown in **Figure 2**. The final location of the traps was determined in the field based on the targeted habitats and habitat features, and the presence of water, flyways or cluttered vegetation. **Table 2.1** lists the locations of harp traps within the project site and the associated REs. Reference photos and habitat descriptions of the monitoring sites are provided in **Appendix A**.

Traps were left for a period of five nights and checked once at night and once at dawn. Any bats captured at night were identified and released at night. Animals collected at dawn were identified and released the following night, with the exception of individuals captured on the last survey morning which were immediately released following identification. Identification was undertaken through the use of the identification keys within Australian Bats (Churchill, 2009).

**Table 2.1 Harp trap locations**

| Site | Easting | Northing  | RE   |
|------|---------|-----------|--|
| HT1  | 248,099 | 7,319,848 | 11.10.1: <i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks |
| HT2  | 247,421 | 7,319,745 | 11.10.1: <i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks |

**Table 2.1 Harp trap locations**

| Site | Easting | Northing  | RE   |
|------|---------|-----------|--|
| HT3  | 247189  | 7,319,012 | 11.10.1: <i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks   |
| HT4  | 247,083 | 7,319,438 | Non-remnant  |
| HT5  | 247,217 | 7,318,711 | Non-remnant  |
| HT6  | 245,669 | 7,318,730 | 11.8.4: <i>Eucalyptus melanophloia</i> open woodland on Cainozoic igneous rocks  |
| HT7  | 246,363 | 7,318,639 | 11.9.9: <i>Eucalyptus crebra</i> woodland on fine-grained sedimentary rocks  |
| HT8  | 245,336 | 7,318,341 | 11.9.13/11.10.1: <i>Eucalyptus moluccana</i> or <i>E. microcarpa</i> open forest on fine grained sedimentary rocks / <i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks |
| HT9  | 246,380 | 7,317,683 | 11.9.9: <i>Eucalyptus crebra</i> woodland on fine-grained sedimentary rocks  |
| HT10 | 245,887 | 7,317,991 | 11.3.25: <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines  |

### 2.2.3 Survey Effort

Field surveys were undertaken over five nights from 24 to 29 April 2017. A total of 10 sites were surveyed over this period, providing a total of 50 harp trap nights.

### 2.2.4 Survey Personnel

#### i. Katrina Wolf

Katrina is a Principal at Cumberland Ecology, with over ten years of ecological consulting experience. Katrina has managed and participated in numerous small- to large-scale projects and has extensive experience undertaking flora and fauna surveys, ecological impact assessment, biodiversity monitoring and auditing.

Katrina is actively involved in undertaking field surveys, with extensive experience in designing and undertaking flora and fauna surveys. Katrina's field experience is within the Sydney Region, Hunter Valley, Western Blue Mountains, Gunnedah Basin, Central Coast and Mid North Coast in New South Wales, the Callide Basin, Bowen Basin and Galilee Basin in Queensland, and Groote Eylandt in the Northern Territory.

Field surveys undertaken for microchiropteran bats have included both passive and active survey techniques during surveys that have been designed to follow State and Commonwealth survey guidelines. Survey methods undertaken include ultrasonic bat detection using Anabat ZCAIM (Titley Scientific Pty Ltd), Anabat SD2 (Titley Scientific Pty Ltd) and Song Meter SM2+ (Wildlife Acoustics Inc) units, harp trapping using a 2-bank design, and trip lining using monofilament fishing line. Katrina has previously captured the

South-eastern Long-eared Bat using harp trapping techniques as part of a 22-trap night survey within a large scale development in New South Wales.

*ii. Matthew Freeman*

Matthew Freeman is a Project Manager/Ecologist at Cumberland Ecology, with five years of ecological consulting experience. Matthew has been responsible for managing and/or undertaking fauna and flora surveys for a range of projects ranging from small residential and infrastructure ecological impact assessments to large scale mining projects across New South Wales, Queensland and the Northern Territory.

Matthew is regularly involved with field surveys and has extensive experience identifying terrestrial and aquatic vertebrate fauna, including mammals, reptiles, birds, amphibians and fish. In regards to microchiropteran bats, Matthew has carried out both passive and active surveys techniques in accordance with the State and Commonwealth survey guidelines. Survey methods undertaken include ultrasonic bat detection using Anabat ZCAIM (Titley Scientific Pty Ltd), Anabat SD2 (Titley Scientific Pty Ltd) and Song Meter SM2+ (Wildlife Acoustics Inc) units and harp trapping using a 2-bank design. Matthew has also been involved with work in the United Kingdom and has undertaken microchiropteran bat surveys using passive survey techniques. This included the use of ultrasonic detection using Song Meter SM2+ and SM4 (Wildlife Acoustics Inc) units and the Batlogger M device (Elekon). Targeted searches in roof cavities and hollow bearing trees were also regularly undertaken.

Matthew has been involved with translocation projects for microchiropteran bats which have been captured during vegetation clearing. Matthew has captured the South-eastern Long-eared bat on several occasions during a translocation program in New South Wales and is familiar with identifying this species. In 2017, Matthew managed and participated in a radio tracking program for microchiropteran bats in the Gunnedah basin of NSW. The program was designed to investigate the impact of vegetation clearance for mining expansion on selected bats and provide information on the relocation of bats after disturbance.

### **2.2.5 Weather Conditions**

Average monthly rainfall and temperature data in the lead up to and during the field survey was obtained from the Bureau of Meteorology weather stations at Thangool Airport (Station 039089) and is shown in **Graph 2.1**. Thangool Airport was used for this data as it is the nearest station to the project site that records both rainfall and temperature and is considered to be broadly representative of the conditions in the project site.

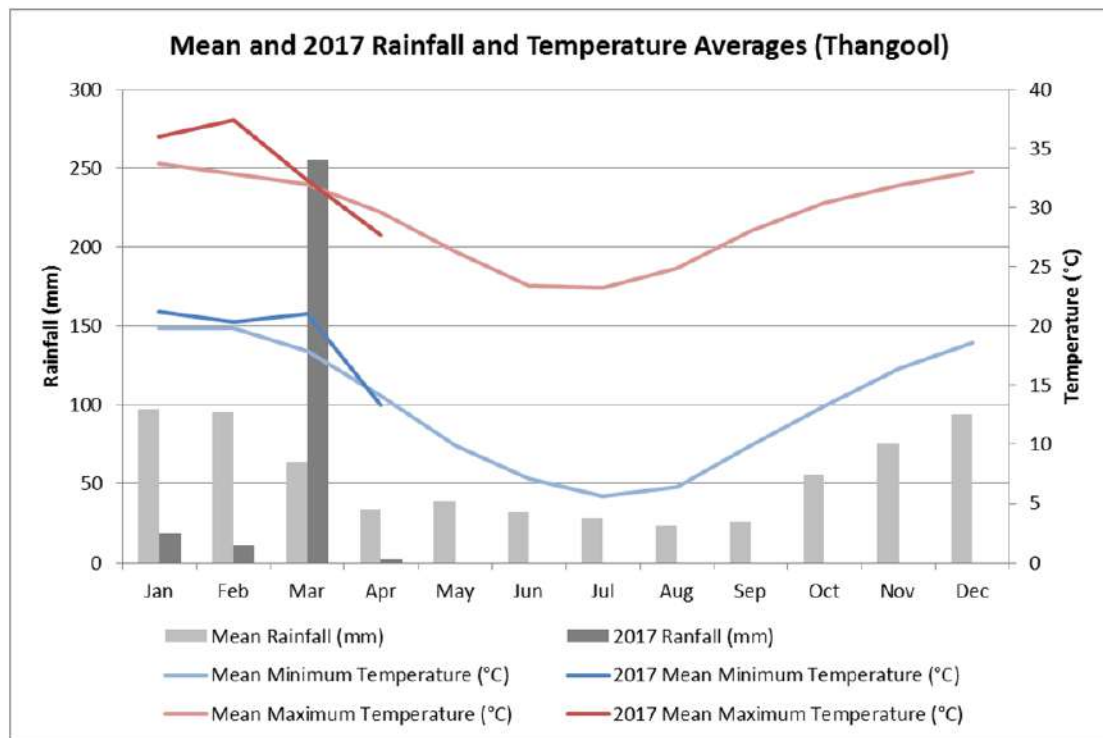
**Table 2.2** summarises the daily weather observations during the survey period. During the field survey the weather was mild to warm, with only one day of limited rainfall. The average minimum temperature was 11.1°C and the average maximum temperature was 26.2°C. Evenings were cool, with occasional winds and varying levels of cloud cover.

Bats were captured over all five trap nights, including the nights with the coolest recorded minimum temperature and highest maximum wind gust. The coolest recorded minimum temperature occurred on the evening of 28 April 2017 / morning of 29 April 2017 (the fifth trap night), hence only one trap night experienced cool minimum overnight temperatures.

Maximum daily wind gusts were recorded during the evening on two trap nights on 25 April and 26 April (the second and third trap nights). All other maximum daily wind gusts were recorded during daytime hours.

**Table 2.2 Daily weather observations during the survey period**

| Date       | Temperature (°C) |         | Rain (mm) | Maximum Wind Gust |               |       |
|------------|------------------|---------|-----------|-------------------|---------------|-------|
|            | Minimum          | Maximum |           | Direction         | Speed (km/hr) | Time  |
| 24/04/2017 | 13.8             | 28.4    | 0.0       | ESE               | 28            | 13:34 |
| 25/04/2017 | 12.3             | 29.6    | 0.0       | NNE               | 19            | 18:51 |
| 26/04/2017 | 13.1             | 29.7    | 0.0       | SSW               | 41            | 19:41 |
| 27/04/2017 | 15.5             | 21.7    | 1.6       | SSW               | 37            | 15:18 |
| 28/04/2017 | 5.9              | 21.4    | 0.0       | SSW               | 32            | 08:30 |
| 29/04/2017 | 5.8              | 26.5    | 0.0       | E                 | 28            | 10:47 |



**Graph 2.1 Mean and 2017 rainfall and temperature averages (Thangool)**

### **2.2.6 Limitations**

The following specific limitations are relevant to the survey undertaken within the project site:

- Survey effort was based on selective sampling, rather than survey effort based on the total area of low value habitat (approximately 347 ha) within the project site due to the size of the project site and required survey timeframe; and
- Despite the survey being undertaken within the recommended survey period outlined within the survey guidelines, weather conditions on some trap nights may have reduced the number and diversity of bat species trapped. Despite cooler minimum temperatures, or maximum wind gusts, bats were captured on all survey nights. Given that bats were recorded on each survey night, including bat species of a smaller body weight than the South-eastern Long-eared Bat, it is considered unlikely that the South-eastern Long-eared Bat would not have been recorded due to weather conditions during the survey nights, if it was present in the area.

In general, data obtained from field survey is a “snapshot” in time and identifies the bats that were active during the time of the field survey and that could be surveyed using harp traps. Therefore the data produced by the surveys is not an absolute census of all bats occurring within the project site. However the results of the targeted field survey have been considered in conjunction with previous surveys and database analysis. None of the limitations outlined above are considered to have significantly impacted the results of the survey.

## Results

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### 3.1 Literature and Database Review

The Queensland Wildlife Online database holds no records of the South-eastern Long-eared Bat within a 50km radius or 100km radius of the project site. **Table 3.1** lists the species from the *Nyctophilus* genus and the number of records held within the Queensland Wildlife Online database.

**Table 3.1** Queensland Wildlife Online database records of the *Nyctophilus* genus

| Scientific Name              | Common Name             | Sightings in 50 km<br>Radius of Project Site | Sightings in 100 km<br>Radius of Project Site |
|------------------------------|-------------------------|--|---|
| <i>Nyctophilus bifax</i>     | Northern Long-eared Bat | 5  | 73  |
| <i>Nyctophilus geoffroyi</i> | Lesser Long-eared Bat   | 13   | 42  |
| <i>Nyctophilus gouldi</i>    | Gould's Long-eared Bat  | 19   | 49  |
| <i>Nyctophilus</i> sp.       |                         | 4  | 20  |

Ultrasonic bat detection undertaken by AECOM (2012) included records of an unidentified species determined to be from the *Nyctophilus* genus. All bat calls recorded during AECOM (2012) surveys were identified by Greg Ford of Balance Environmental. *Nyctophilus* calls that are recorded by ultrasonic call detection are unable to be identified to species level. Despite this, the associated call analysis report indicated that the records probably represented two species, namely *Nyctophilus geoffroyi* (Lesser Long-eared Bat) and *Nyctophilus gouldi* (Gould's Long-eared Bat), based on general distribution information and database records.

### 3.2 Harp Trap Survey

Bats were captured at a total of five of the 10 monitoring sites during surveys within the project site. The results of harp trapping surveys are provided in **Table 3.2**. A total of 10 individuals, representing four bat species were captured during surveys, including:

- Eastern Horseshoe Bat (*Rhinolophus megaphyllus*) (HT6);

- Gould's Wattled Bat (*Chalinolobus gouldii*) (HT4);
- Little Pied Bat (*Chalinolobus picatus*) (HT6); and
- Gould's Long-eared Bat (*Nyctophilus gouldi*) (HT2, HT3, HT4, HT6).

The South-eastern Long-eared Bat was not recorded during harp trapping.

**Table 3.2 Bat species recorded during harp trap surveys**

| Family            | Scientific Name                | Common Name            | EPBC Act Status | Location | Number | Time of Collection |
|-------------------|--------------------------------|------------------------|-----------------|----------|--------|--------------------|
| <b>25/04/2017</b> |                                |                        |                 |          |        |                    |
| Rhinolophidae     | <i>Rhinolophus megaphyllus</i> | Eastern Horseshoe Bat  | -               | HT6      | 1      | Dawn               |
| Vespertilionidae  | <i>Nyctophilus gouldi</i>      | Gould's Long-eared Bat | -               | HT6      | 1      | Dawn               |
| <b>26/04/2017</b> |                                |                        |                 |          |        |                    |
| Vespertilionidae  | <i>Chalinolobus picatus</i>    | Little Pied Bat        | -               | HT6      | 1      | Dawn               |
| Vespertilionidae  | <i>Chalinolobus gouldii</i>    | Gould's Wattled Bat    | -               | HT4      | 1      | Night              |
| <b>27/04/2017</b> |                                |                        |                 |          |        |                    |
| Vespertilionidae  | <i>Nyctophilus gouldi</i>      | Gould's Long-eared Bat | -               | HT2      | 3      | Dawn               |
| <b>28/04/2017</b> |                                |                        |                 |          |        |                    |
| Vespertilionidae  | <i>Nyctophilus gouldi</i>      | Gould's Long-eared Bat | -               | HT3      | 1      | Dawn               |
| Vespertilionidae  | <i>Nyctophilus gouldi</i>      | Gould's Long-eared Bat | -               | HT6      | 1      | Dawn               |
| <b>29/04/2017</b> |                                |                        |                 |          |        |                    |
| Vespertilionidae  | <i>Nyctophilus gouldi</i>      | Gould's Long-eared Bat | -               | HT4      | 1      | Dawn               |



## Conclusion

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No individuals of the South-eastern Long-eared Bat were recorded during the field survey. Therefore, based on this survey, the approval holder is not required to provide an offset for the loss of potential habitat of this species within the project site resulting from the Project.

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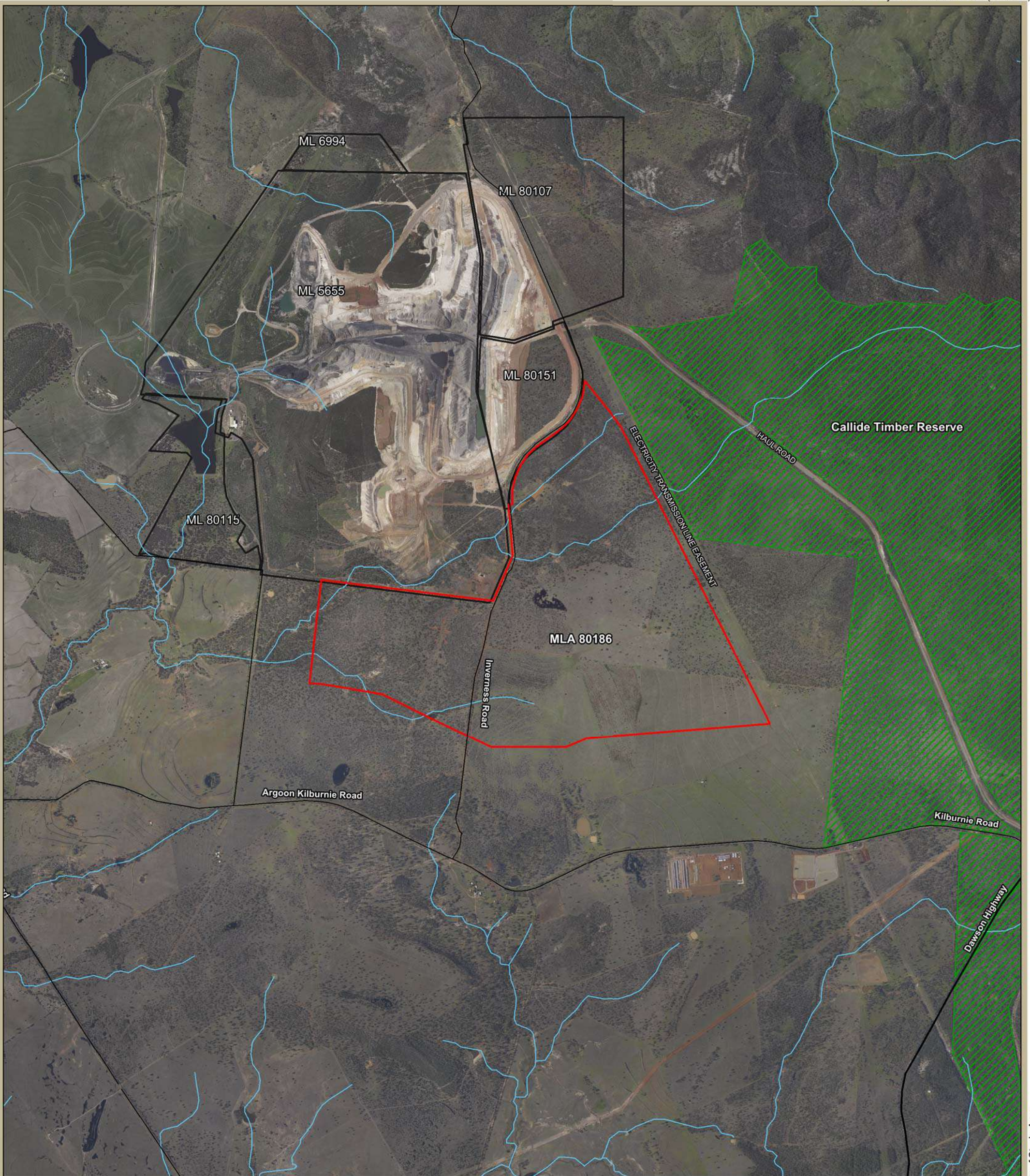
# Figures

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This section contains the following figures:

- **Figure 1:** Location of the Project Site; and
- **Figure 2:** Location of harp trap sites within the Project Site.





- Legend**
- Project Site
  - Mining Leases
  - National Parks, Forest Reserves and State Forests
  - Highway
  - Road
  - Ephemeral Drainage Line

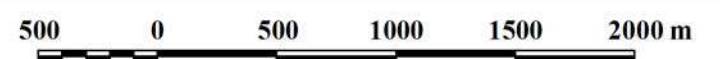
Image Source:  
Anglo American Feb 2013

Data Source:  
© Copyright Commonwealth of Australia  
(Geoscience Australia) 2006

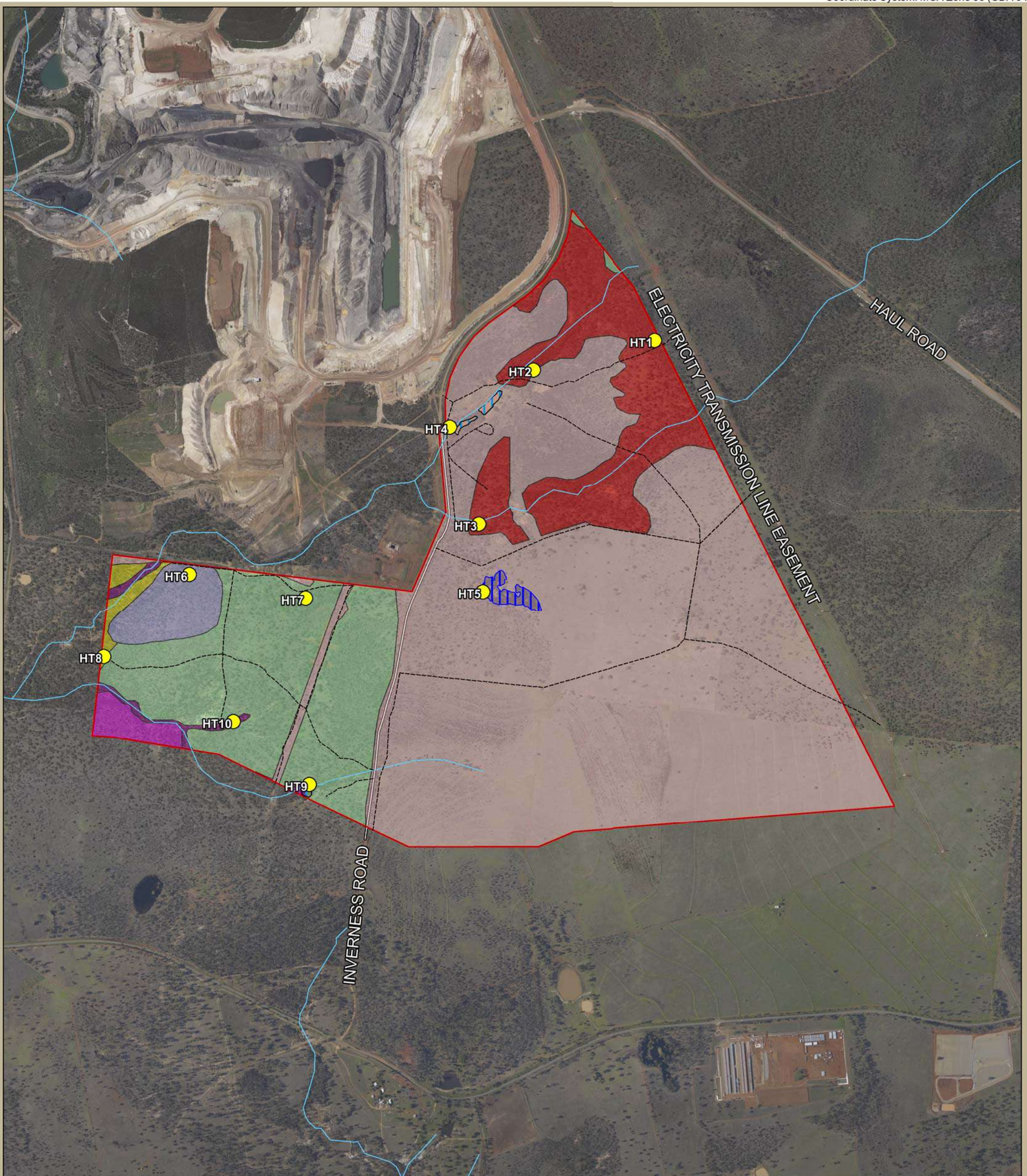
© State of Queensland (Department of National  
Parks, Recreation, Sport and Racing) 2014.  
Updated data available at  
<http://dds.information.qld.gov.au/dds/>.



Figure 1. Location of the Project Site







**Legend**

- Project Site
- Harp Trap Location

**Access Roads/Tracks**

- Inverness Road
- Tracks

**Watercourses/Dams/Wetlands**

- Farm Dam
- Seasonal Wetland
- Ephemeral Drainage Line

**Regional Ecosystem Mapping (v9.0)**

- 11.3.25
- 11.8.4
- 11.9.9
- 11.9.13
- 11.9.13/11.10.1
- 11.10.1
- Non-remnant

Image Source:  
Anglo American Feb 2013

Data Source:  
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(Geoscience Australia) 2006

© The Department of Science, Information  
Technology and Innovation (2015). Copy  
of the Remnant Regional Ecosystem Map,  
-Version 9.0.



Figure 2. Location of harp trap sites within the Project Site





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*Appendix A*

Site Descriptions and Photographs



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**Table A.1 Site descriptions and photographs**



| Site | RE      | RE Structure      | Description   | Photograph   |
|------|---------|-------------------|---|--|
| HT1  | 11.10.1 | Woodland – Sparse | <p>Site dominated by a dense mid-storey of <i>Acacia</i> regrowth, with occasional <i>Eucalyptus exserta</i>. Site has a grassy understorey, with occasional shrub cover. Roosting habitat present in the form of decorticated bark and hollow-bearing trees. Trap positioned along flyway between midstorey cover, in proximity to canopy trees.</p> |   |
| HT2  | 11.10.1 | Woodland – Sparse | <p>Site dominated by <i>Corymbia citriodora</i> and <i>Eucalyptus crebra</i>. No old growth canopy trees present; however many stages of immature trees present. Site has an open grassy understorey. Roosting habitat present in the form of decorticated bark and hollow-bearing trees. Trap positioned along a drainage line flyway.</p>           |  |

**Table A.1 Site descriptions and photographs**


| Site | RE          | RE Structure      | Description  | Photograph   |
|------|-------------|-------------------|--|--|
| HT3  | 11.10.1     | Woodland – Sparse | <p>Site dominated by <i>Corymbia citriodora</i>, with occasional <i>Eucalyptus crebra</i>. No old growth canopy trees present. Site has a predominantly grassy understorey with occasional dense patches of shrubs. Roosting habitat present in the form of hollow-bearing trees. Trap positioned adjacent to a drainage line.</p> |   |
| HT4  | Non-remnant | n/a               | <p>Site dominated by <i>Corymbia citriodora</i>, with both mature and regrowth canopy trees present. <i>Acacia</i> regrowth common in midstorey. Site has an open grassy understorey. Roosting habitat present in the form of hollow-bearing trees. Trap positioned adjacent to dam.</p>   |  |





**Table A.1 Site descriptions and photographs**

| Site | RE          | RE Structure           | Description  | Photograph   |
|------|-------------|------------------------|--|--|
| HT5  | Non-remnant | n/a                    | <p>Site dominated by <i>Eucalyptus tereticornis</i>, with occasional <i>Eucalyptus crebra</i>. Numerous old growth trees located in proximity to site, with some regrowth vegetation present. Site has a predominantly grassy understorey, with occasional shrubs. Roosting habitat present in the form of decorticated bark and hollow-bearing trees. Trap positioned adjacent to a seasonal wetland.</p> |   |
| HT6  | 11.8.4      | Open Woodland – Sparse | <p>Site dominated by <i>Eucalyptus crebra</i>, with occasional <i>Corymbia citriodora</i> present. No old growth canopy trees present. Site has a mixed grassy and shrubby understorey, with cleared areas along the drainage line. Roosting habitat present in the form of decorticated bark and hollow-bearing trees. Trap positioned along a drainage line.</p>   |  |

**Table A.1 Site descriptions and photographs**

| Site | RE              | RE Structure                                | Description   | Photograph   |
|------|-----------------|---|---|--|
| HT7  | 11.9.9          | Woodland – Sparse                           | Site dominated by <i>Corymbia citriodora</i> , with occasional <i>Eucalyptus crebra</i> present. Canopy comprises trees from mixed age classes. Site has a grassy understorey and acacias common in the midstorey. Roosting habitat present in the form of decorticated bark. Trap positioned along flyway between midstorey cover, in proximity to canopy trees.   |   |
| HT8  | 11.9.13/11.10.1 | Open Forest - mid-dense / Woodland – Sparse | Site dominated by <i>Eucalyptus crebra</i> , with occasional <i>Eucalyptus moluccana</i> present. Canopy comprises trees from mixed age classes. Midstorey comprises regenerating canopy trees and acacias. Site has a predominantly grassy understorey, with occasional patches of shrubs. Roosting habitat present in the form of decorticated bark and hollow-bearing trees. Trap positioned along flyway between midstorey cover, in proximity to canopy trees. |  |

**Table A.1 Site descriptions and photographs**

| Site | RE      | RE Structure            | Description   | Photograph   |
|------|---------|-------------------------|---|--|
| HT9  | 11.9.9  | Woodland – Sparse       | <p>Site dominated by <i>Eucalyptus tereticornis</i> and <i>Eucalyptus crebra</i>, with occasional <i>Corymbia tessellaris</i> present. Canopy comprises trees from mixed age classes. Site has a grassy understorey. Roosting habitat present in the form of decorticated bark and hollow-bearing trees. Trap positioned adjacent to a dam.</p>           |   |
| HT10 | 11.3.25 | Open Forest – Mid-dense | <p>Site dominated by <i>Eucalyptus crebra</i>, with occasional <i>Corymbia tessellaris</i> present. No old growth canopy trees present. Midstorey comprises regenerating canopy trees and acacias. Site has a mixed grassy and shrubby understorey. Roosting habitat present in the form of decorticated bark. Trap positioned along a drainage line.</p> |  |