Baralaba North Continued Operations Project

Environmental Impact Statement

APPENDIX A

TERRESTRIAL ECOLOGY ASSESSMENT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

TERRESTRIAL ECOLOGY ASSESSMENT

PREPARED BY
RESOURCE STRATEGIES PTY LTD

APRIL 2014
Project No. COC-13-01
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EXECUTIVE SUMMARY

This report has been prepared by Resource Strategies as part of the Environmental Impact Statement for the Baralaba North Continued Operations Project (BNCOP), an open cut coal mining operation. Cockatoo Coal Limited is seeking approval for the BNCOP under the Queensland (Qld) *Environmental Protection Act 1994* (EP Act).

The BNCOP is located approximately 115 kilometres south-west of Rockhampton, in the lower (south-east) Bowen Basin region of central Qld. The BNCOP provides for the continuation and expansion of open cut coal mining and introduction of processing activities at the existing Baralaba Coal Mine (Mining Lease (ML) 80157 and ML5605) and the approved Baralaba North/Wonbindi North Mine (ML80169 and ML80170).

The purpose of this report is to provide an assessment of the likely adverse impacts on terrestrial flora and vertebrate fauna arising from the BNCOP and measures that would be implemented to avoid, mitigate and offset impacts. The assessment has been prepared with consideration of the relevant State and Commonwealth legislation, policies and guidelines. This terrestrial ecology assessment was peer reviewed by Professor David Goldney (Cenwest Environmental Services).

Setting

The BNCOP is in a predominately agricultural landscape located in the north-eastern portion of the Brigalow Belt South Interim Biogeographic Regionalisation for Australia Bioregion. Past and ongoing agricultural activities (e.g. clearing, grazing, thinning, cropping) have resulted in a variety of modified and fragmented habitats. Older vegetation (which meets the definition of 'Remnant' under the *Vegetation Management Act 1999* (Qld) [VM Act]) occurs in patches, often retained along watercourses, in seasonally damp areas, as windbreaks between cultivated paddocks or as stock shelter. Some paddocks have been ploughed and others are used for grazing livestock. Cleared areas subject to lighter grazing contain scattered regrowth of trees and shrubs.

Terrestrial Flora and Vertebrate Fauna Surveys

This terrestrial ecology assessment was prepared using relevant database sources and a review of past and recent terrestrial flora and fauna surveys relevant to the BNCOP Additional Footprint (the proposed BNCOP Operational Land outside of the approved Baralaba North/Wonbindi North Mine). The terrestrial flora and fauna within the BNCOP Additional Footprint and surrounding land was recently characterised through surveys undertaken in autumn (April 2013) and spring (October 2013) by RPS Australia East. The survey report by RPS Australia East is appended to this assessment.

Vegetation communities within the BNCOP Additional Footprint and surrounding land were classified according to the regional ecosystem classification and relevant threatened ecological community definitions under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Standard flora survey techniques were employed.

A variety of fauna survey techniques were used to identify vertebrate fauna in consideration of the relevant State and Commonwealth survey guidelines. These techniques include: The use of Elliott A traps, Elliott B traps, cage traps, pitfall traps, funnel traps, harp traps, bat detection devices, motion detection cameras, spotlighting, diurnal bird surveys, active searches, call playback, Koala spot assessment and habitat assessment. A conservative list of potentially occurring conservation significant terrestrial fauna species was targeted during the surveys.

Vegetation

The native vegetation in BNCOP Additional Footprint is mostly woodland/forest in patches. Nine regional ecosystems occur in the BNCOP locality representing (in order of dominance) Riparian Woodland, Eucalypt Open Forest, Brigalow Palustrine Wetlands, Brigalow Woodlands and Ephemeral Wetlands. The Riparian Woodland occurs along watercourses and is relatively continuous compared to other vegetation types which are highly fragmented and degraded (to various degrees) by weeds (including declared plants), declared animals and edge effects.

The vegetation present in the BNCOP Additional Footprint includes two regional ecosystems dominated by Brigalow (*Acacia harpophylla*) that are listed as 'Endangered' under the VM Act (regional ecosystem [RE] 11.3.1 [Brigalow Woodlands] and RE11.4.8a [Brigalow Palustrine Wetlands]). The Brigalow Woodlands and Brigalow Palustrine Wetlands in the BNCOP Additional Footprint are highly fragmented and many patches are subject to on-going livestock grazing. Some small occurrences of these two regional ecosystems (those that are in better condition) meet the criteria for the *Brigalow (Acacia harpophylla Dominant and Co-dominant) Threatened Ecological Community* (Brigalow TEC) listed under the EPBC Act. There are three patches of Brigalow TEC in the BNCOP Additional Footprint ranging from approximately 2.5 hectares (ha) to 4 ha, totalling approximately 9 ha (equating to 0.6% of the BNCOP Additional Footprint). 'Remnant' states of RE11.3.1 (Vegetation Community 1a) and RE11.4.8a (Vegetation Community 3a and part of 3b) with a biodiversity status of 'Endangered' could be considered Category B Environmentally Sensitive Areas as defined under the EP Act.

There is also one regional ecosystem listed as 'Of Concern' under the VM Act (RE11.3.3) which is equivalent to the *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions Threatened Ecological Community* (Coolibah-Black Box Woodland TEC) listed under the EPBC Act. The Coolibah-Black Box Woodland TEC occurs on the floodplains on local rivers and creeks and would be avoided by the BNCOP.

Vertebrate Fauna and Their Habitats

The woodland/forest vegetation in the BNCOP Additional Footprint has been categorised into four broad fauna habitat types (in order of dominance): Eucalypt Open Forest Habitat Type; Brigalow Palustrine Wetland Habitat Type; Brigalow Woodland Habitat Type and Riparian Woodland Habitat Type as well as disturbed versions of these habitats.

Some habitat patches have multiple structural layers (e.g. overstorey, midstorey and groundcover) and other patches are heavily grazed (with diminished groundcover) and have only a single tree layer. Past disturbance and clearance has resulted in reduced abundance of tree hollows across the BNCOP Additional Footprint and regrowth vegetation (with few if any hollows) is common.

Cleared land is dominated by pasture improved non-native vegetation. Some paddocks have been ploughed and others are used for grazing livestock. Cleared areas subject to lighter grazing contain scattered regrowth of trees and shrubs. Other areas have been recently cleared by private landholders and scattered or patches of tree stags remain standing.

Water sources in the BNCOP Additional Footprint are limited to farm dams and ephemeral gilgai depressions and drainage lines. The Dawson River, Dawson River Anabranch and the wetland to the north of the BNCOP Operational Land (i.e. the North-west Soak) (all outside of the BNCOP Additional Footprint) provide key habitat resources for fauna in the locality due to the presence of water, older woodland/forest vegetation in riparian habitat (with tree hollows), and a relatively continuous corridor of habitat through the local catchment.

A range of fauna species have been recorded during surveys covering the BNCOP Additional Footprint and surrounding habitats which are a subset of the more widely occurring species assemblages. The highest number of amphibian species (13 species), reptile species (21 species) and mammal species (15 species) were recorded in the Riparian Woodland Habitat Type in the wider area. The most number of bird species were recorded in the Eucalypt Open Forest Habitat Type (62 species).

Threatened Species

No conservation significant flora species listed under the *Native Conservation Act 1992* (Qld) (NC Act) and/or EPBC Act have been located in the BNCOP locality. This may be due to past degradation of the potential habitat (and loss of the plants from the area).

One threatened fauna species listed under the NC Act and/or EPBC Act (as 'Vulnerable') has been confirmed within the BNCOP Additional Footprint, namely, the Squatter Pigeon (southern) (*Geophaps scripta scripta*). The Squatter Pigeon (southern) has been recorded through-out the BNCOP Additional Footprint and surrounding locality (on multiple occasions) during recent fauna surveys. The Squatter Pigeon (southern) was recorded in a number of different habitat types including Riparian, Disturbed Brigalow Palustrine Wetland, Eucalypt Open Forest and within cleared grazing paddocks.

A second species listed under the NC Act and EPBC Act, the South-eastern Long-eared Bat (*Nyctophilus corbeni*) ('Vulnerable'), may have been recorded but the Anabat call recordings are not definitive for this species. Again, this species is a habitat generalist and would potentially use all habitat types in the BNCOP Additional Footprint and surrounding locality.

A third threatened fauna species listed under the NC Act and/or EPBC Act (as 'Vulnerable') has been recorded outside of the BNCOP Additional Footprint, namely, the Ornamental Snake (*Denisonia maculata*). This species has more specific habitat requirements than the Squatter Pigeon (southern) and South-eastern Long-eared Bat. The Ornamental Snake is most likely to occur in Brigalow-dominated ecosystems supporting gilgai formations.

Other Conservation Significant Species

Three 'Near Threatened' fauna species under the NC Act have been recorded in the BNCOP locality; two waterbirds (the Black-necked Stork [*Ephippiorhynchus asiaticus*] and Cotton Pygmy-goose [*Nettapus coromandelianus*]) as well as the Little Pied Bat (*Chalinolobus dwyeri*). Only sub-optimal minor habitat for both waterbirds occurs in the BNCOP Additional Footprint (e.g. a farm dam), although some surrounding riverine/wetland areas provide more suitable habitat which may attract these species to the locality. The Little Pied Bat is likely to forage in the woodland/forest habitat and may also roost in tree hollows.

One 'Special Least Concern' fauna species under the NC Act, the Short-beaked Echidna (*Tachyglossus aculeatus*), has been recorded outside of the BNCOP Additional Footprint. 'Special Least Concern' fauna species listed under the NC Act are species that are common or abundant and likely to survive in the wild but have special cultural significance.

Evaluation of Potential Impacts on Terrestrial Ecology

The land within the BNCOP Additional Footprint (1,486 ha) is largely cleared of native woodland/forest vegetation (approximately 1,164 ha [78%] has been previously cleared). The BNCOP would require the clearance of various patches of woodland/forest (totalling approximately 277 ha) over a period of 15 years during construction and operation. This includes 9 ha of Brigalow TEC as mentioned above.

Adverse impacts on terrestrial ecology would mainly occur as a result of the following:

- Removal of woodland/forest patches (between 0.5 and 8 ha) within the BNCOP Additional Footprint.
- Reduction in the area of woodland/forest patches which extend outside of the BNCOP Additional Footprint.
- Localised indirect impacts on surrounding habitats (dust, noise, edge effects).

Potential impacts on conservation significant fauna species (threatened, 'Near Threatened', 'Special Least Concern' and migratory species) are considered in this assessment. In regards to threatened species, the BNCOP would remove habitat known to be used by the Squatter Pigeon (southern) and potentially used by the Ornamental Snake and South-eastern Long-eared Bat.

The Squatter Pigeon (southern) is commonly recorded in fragmented landscapes in the Brigalow Belt South Bioregion. Habitat resources for the Squatter Pigeon (southern) (e.g. drinking sources, remnant and regrowth vegetation for foraging/roosting and nesting habitat) would remain outside of the BNCOP Additional Footprint, such that the species is likely to persist in the surrounding landscape.

The Ornamental Snake is known to occur in habitats outside of the BNCOP Additional Footprint. Recent radio-tracking studies have shown the snake is relatively sedentary. The cleared land between the known habitat outside and the potential habitat inside the BNCOP Additional Footprint is likely to impede the snake's movement into the BNCOP Additional Footprint and reduce the likelihood that the BNCOP would impact the extant populations within those patches. The likelihood of indirect impacts on the Ornamental Snake, and its habitat, has been assessed and the causes of potential indirect impacts would be managed.

If the South-eastern Long-eared Bat is present in the area, potential foraging habitat would be removed through clearance of woodland/forest and some potential breeding events curtailed where there are hollow-bearing trees. These resources are not limited to the BNCOP Additional Footprint. Hollow-bearing trees are more abundant outside of the BNCOP Additional Footprint along the Dawson River and Dawson River Anabranch as the woodland/forest vegetation is typically older.

It is unlikely that the BNCOP would result in the loss of threatened vertebrate species diversity in the region, given the same vegetation communities and habitats occur more widely in the surrounding landscape. Furthermore the threatened species that could potentially use or are likely to use these habitats in the BNCOP Additional Footprint are part of widely distributed populations rather than members of a series of semi-closed meta-populations. Hence the BNCOP is unlikely to result in the loss of resilience of any threatened species population or to adversely impact on gene flow within the wider populations. Cumulative impacts have been assessed.

Impact Avoidance and Mitigation

CCL has committed to a number of measures with the aim of mitigating unavoidable adverse impacts on terrestrial ecology, including:

- vegetation clearance procedures that specify when and how vegetation would be cleared with the view of minimising impacts on terrestrial flora and fauna;
- specific measures to manage conservation significant vertebrate fauna;
- progressive establishment of woodland/forest cover on the post-mine landforms;
- measures to prevent, monitor and control weeds and pests;
- measures to prevent and manage bushfire risk;

- various measures to manage other environmental factors (e.g. dust suppression, erosion and sediment control, water management); and
- a program to monitor the effectiveness of the management measures.

Progressive establishment of woodland/forest cover on the post-mine landforms would occur during operation of the mine and continue during decommissioning of the BNCOP. Impacts on terrestrial ecology during and after decommissioning would be minimised by progressive establishment of self-sustaining communities and ecosystems with diverse flora species composition and a complex community structure, providing successional habitat opportunities for fauna in the medium to long-term.

Conclusion

After taking into account the proposed impact avoidance and mitigation measures, there would still be some residual adverse impacts on terrestrial ecology values, but the residual impacts are unlikely to put at risk the conservation integrity of the wider populations of existing conservation significant species or vegetation communities. Notwithstanding, CCL has also committed to providing an offset strategy which addresses the residual adverse impacts and specifically benefits the vegetation communities/regional ecosystems that would be impacted by the BNCOP, particularly conservation significant Brigalow dominated communities.

1 INTRODUCTION

This Terrestrial Ecology Assessment was prepared for Cockatoo Coal Limited (CCL) as part of the Environmental Impact Statement (EIS) for the Baralaba North Continued Operations Project (BNCOP).

CCL operates the Baralaba Coal Mine in the lower Bowen Basin region of central Queensland (Qld), just north of the township of Baralaba (Figure 1). The BNCOP provides for the continuation and expansion of open cut coal mining and the introduction of processing activities, at the existing Baralaba Coal Mine (Mining Lease [ML] 80157 and ML5605) and the approved Baralaba North/Wonbindi North Mine (ML80169 and ML80170). CCL is seeking approval for the BNCOP under the *Environmental Protection Act 1994* (Qld)(EPBC Act).

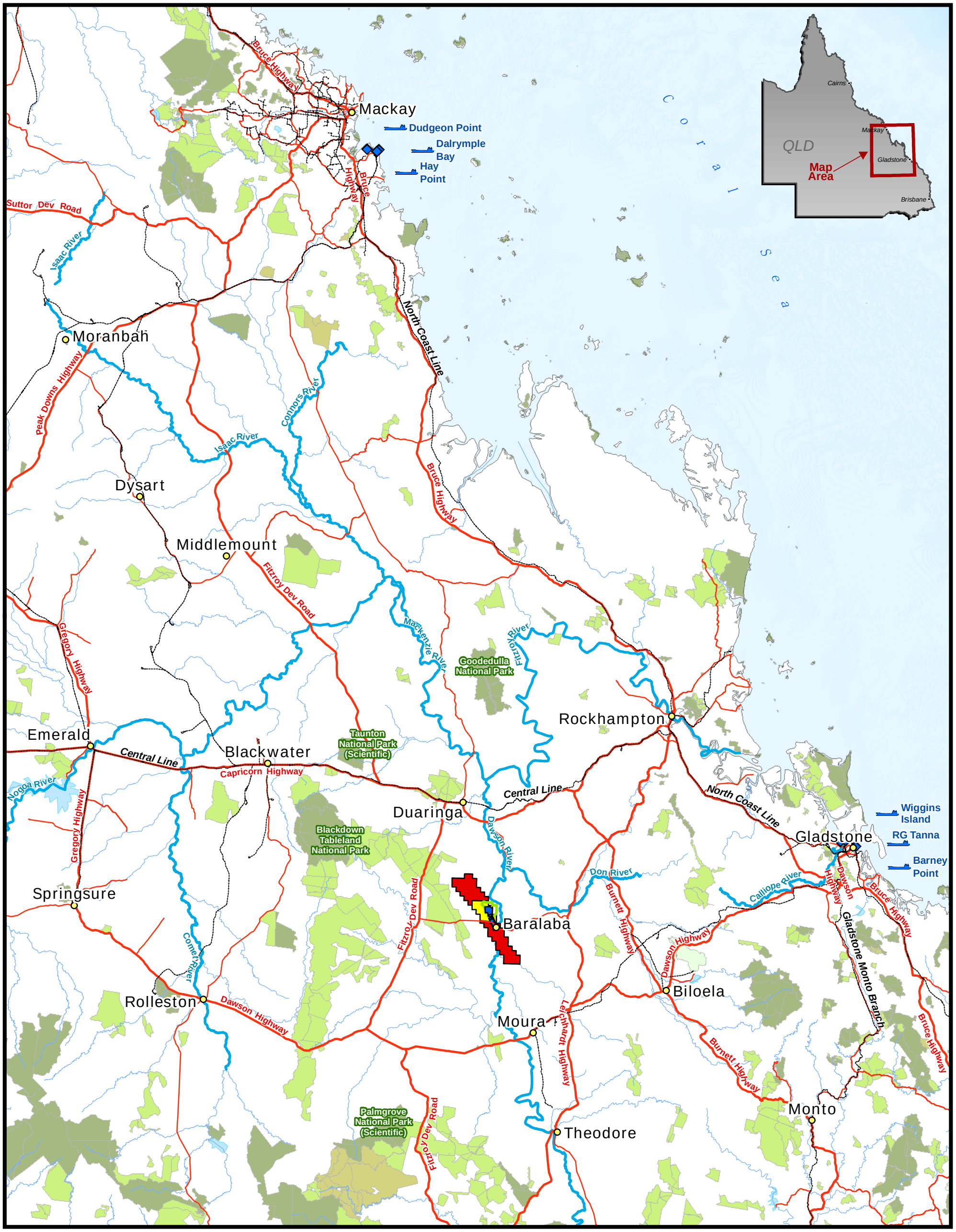
The BNCOP is located approximately 115 kilometres (km) south-west of Rockhampton, in the lower south-east Bowen Basin region of central Qld (Figure 1). The BNCOP is located approximately 45 km north of Moura, and 70 km north-west of Biloela within the Central Highlands Local Government Area.

The proposed life of the BNCOP is 15 years, commencing 1 April 2015 or upon grant of all required approvals. The general arrangement of the BNCOP uses existing infrastructure and services facilities at the Baralaba Coal Mine and integrates with the development of the approved Baralaba North/ Wonbindi North Mine (Figures 2 and 3).

The main activities associated with the development of the BNCOP would include:

- run-of-mine coal production up to 4.1 million tonnes per annum for an additional 15 years (commencing approximately 1 April 2015 or upon grant of all required approvals), including mining operations associated with:
  - continued development of the Baralaba North pit;
  - extension of the Baralaba North pit to the north within Mineral Development Licence 416 (tenement held by Wonbindi Coal Pty Ltd); and
  - spoil dump to the east of the Baralaba North pit within EPC 1237 (tenement held by Queensland Coking Coal Pty Ltd).
- exploration activities;
- progressive backfilling of mine voids with waste material behind the advancing open cut mining operations at the Baralaba North/Wonbindi North Mine and/or within the Baralaba Central final void;
- continued and expanded placement of waste material in out-of-pit emplacements adjacent to the pit extents;
- progressive development of new haul roads and internal roads;
- construction and operation of a coal handling and preparation plant (CHPP) at the Baralaba North/Wonbindi North Mine[1];
- disposal of CHPP rejects on-site within mine voids behind the advancing open cut mining operations and/or within the Baralaba Central final void;
- progressive development of sediment basins and storage dams, pumps, pipelines and other water management equipment and structures (including levees);

[1] Until the CHPP is commissioned and other relevant approvals and upgrades in place, the BNCOP would make continued use of the existing on-site ROM coal handling and crushing facilities at the Baralaba Coal Mine.



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Legend

Populated Place..... Road..... Rail..... Watercourse..... Cockatoo Coal ML..... Cockatoo Coal MDL..... Cockatoo Coal EPC..... BNCOP Operational Land..... Coal Terminal.....

Protected Areas: National Park, Forest Reserve, State Forest, Timber Reserve, Other

Cockatoo Coal Limited

STATUS **FINAL**

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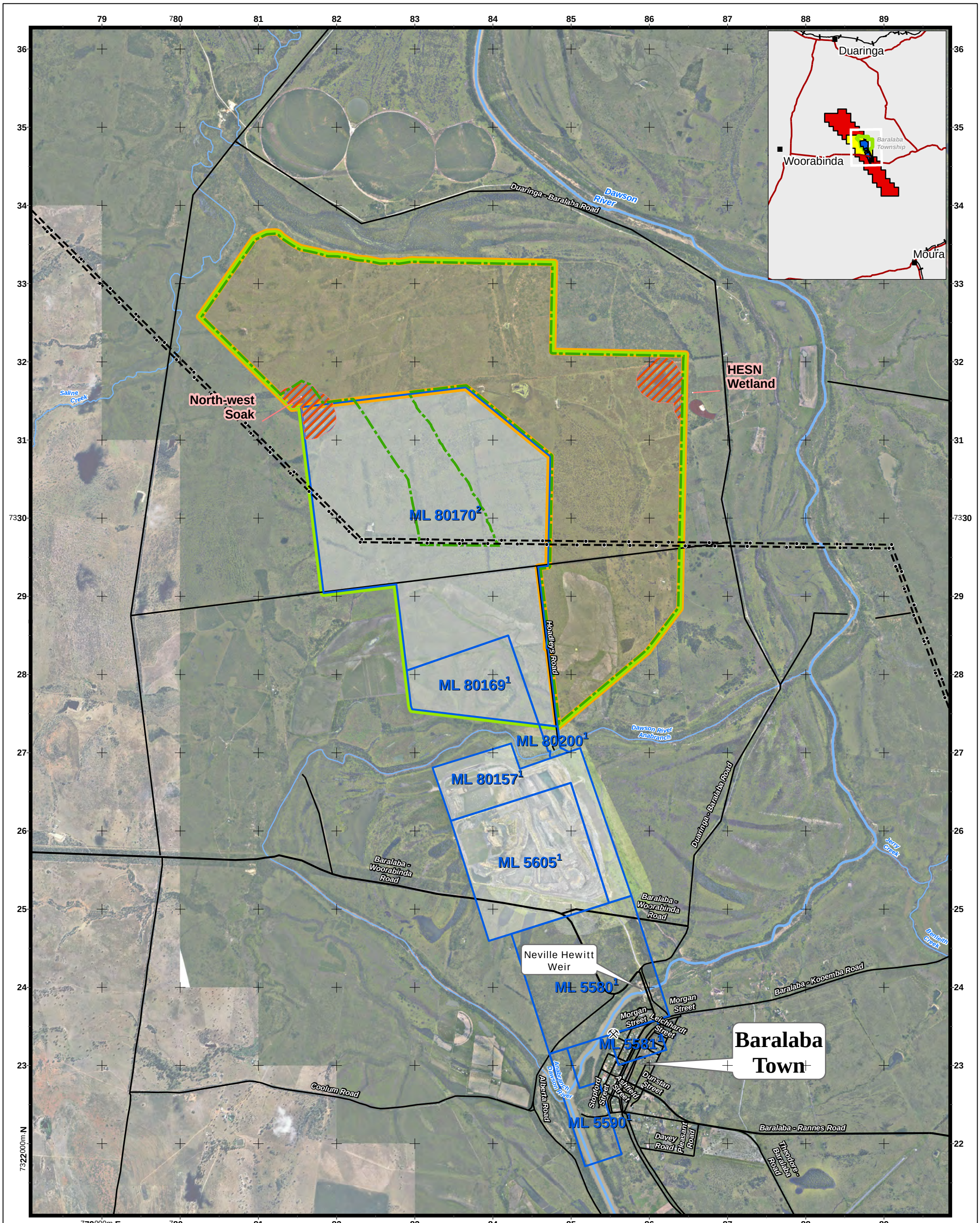

PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

TITLE

Figure 2
BNCOP Assessment Areas

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NOTE:
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Legend

Road.....
Watercourse.....
Powerline & Power Pole.
Cockatoo Coal ML.....
Existing Operational Land.....
BNCOP Operational Land.....
BNCOP Action Area.....
BNCOP Additional Footprint...
Area of Exclusion of Mining Activities.

Cockatoo Coal Limited

STATUS **FINAL**

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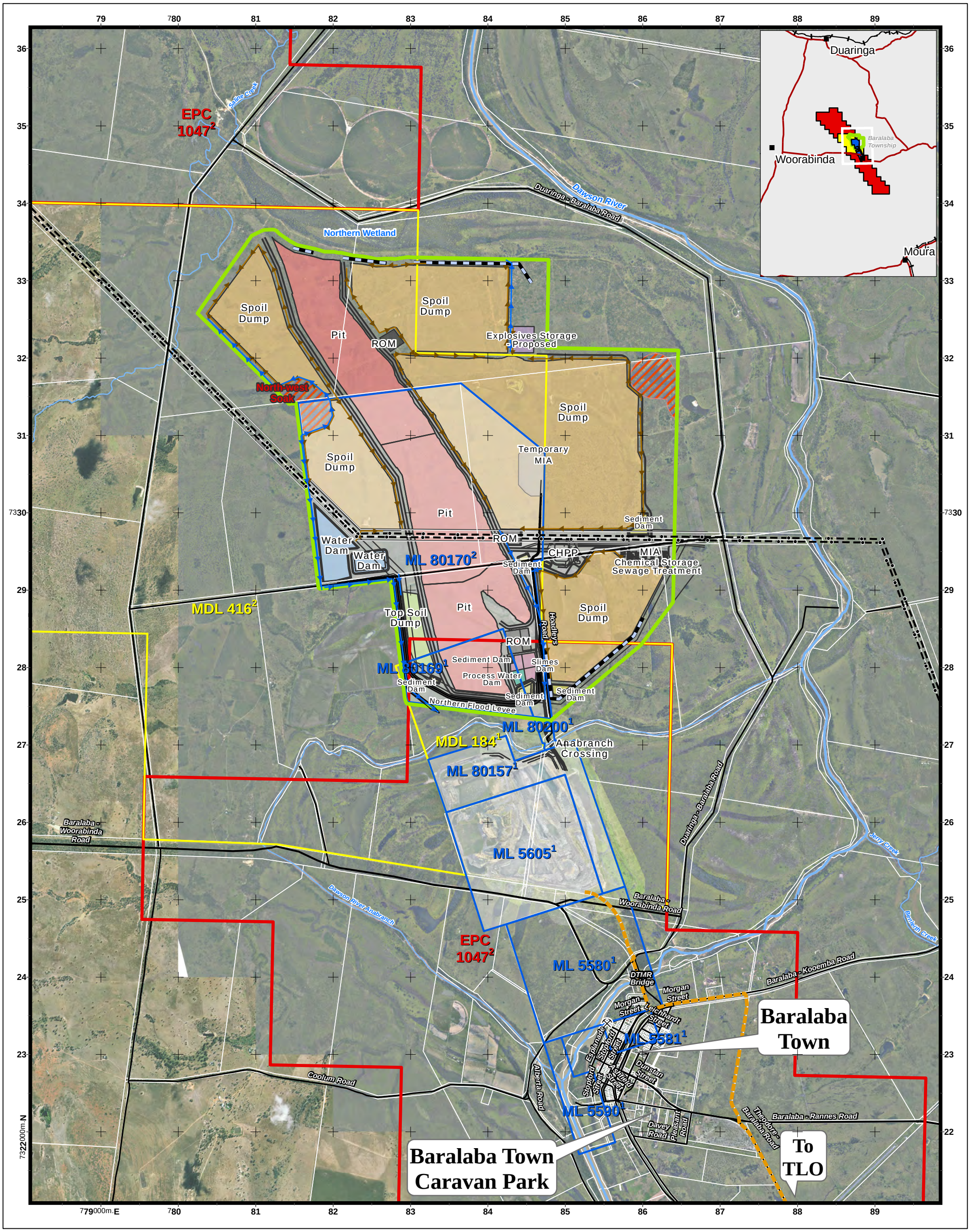

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TITLE **Figure 3** **Indicative Project Layout**	REV	DESCRIPTION	DATE	SCALE **1:45,000**	CURRENT ISSUE SIGNATURES	
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	4	Data & Text Updates	02/04/14	PROJECTION MGA Zone 55	APPROVED	BJD

Legend

Road..... Watercourse..... Cadastre..... Cockatoo Coal ML..... Cockatoo Coal MDL..... Cockatoo Coal EPC..... Area of Exclusion of Mining Activities.....

Product Road Transport Route. Powerline & Power Pole..... BNCOP Operational Land..... Clean Water Drain..... Dirty Water Drain..... Proposed Flood/Erosion Protection Levee.....

Cockatoo Coal Limited

STATUS **FINAL**

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- continued development of soil stockpiles, laydown areas and borrow areas;
- use of upgraded administration and maintenance facilities at the Baralaba Coal Mine and establishment of new mine infrastructure areas at the Baralaba North/Wonbindi North Mine;
- other associated minor infrastructure, plant, equipment and activities, including minor modifications and alterations to existing infrastructure as required to accommodate the increased throughput;
- continued road transport of product coal (using AB triple and AAB quad road-trains) along the "Middle Road" (a network of public roads including Theodore-Baralaba Road) to new product coal stockpiles and train load-out (TLO) facility (subject to separate approvals being in place) (Figure 4); and
- use of new product coal stockpiles and TLO facility for loading of product coal to trains for transport by rail and export via Gladstone.

The area is presently supplied with power. The assessment and approval of the relocation of the existing Powerlink electricity transmission line is currently subject to separate assessment and approval.

1.1 OBJECTIVES OF THE ASSESSMENT

The objectives of this assessment were to:

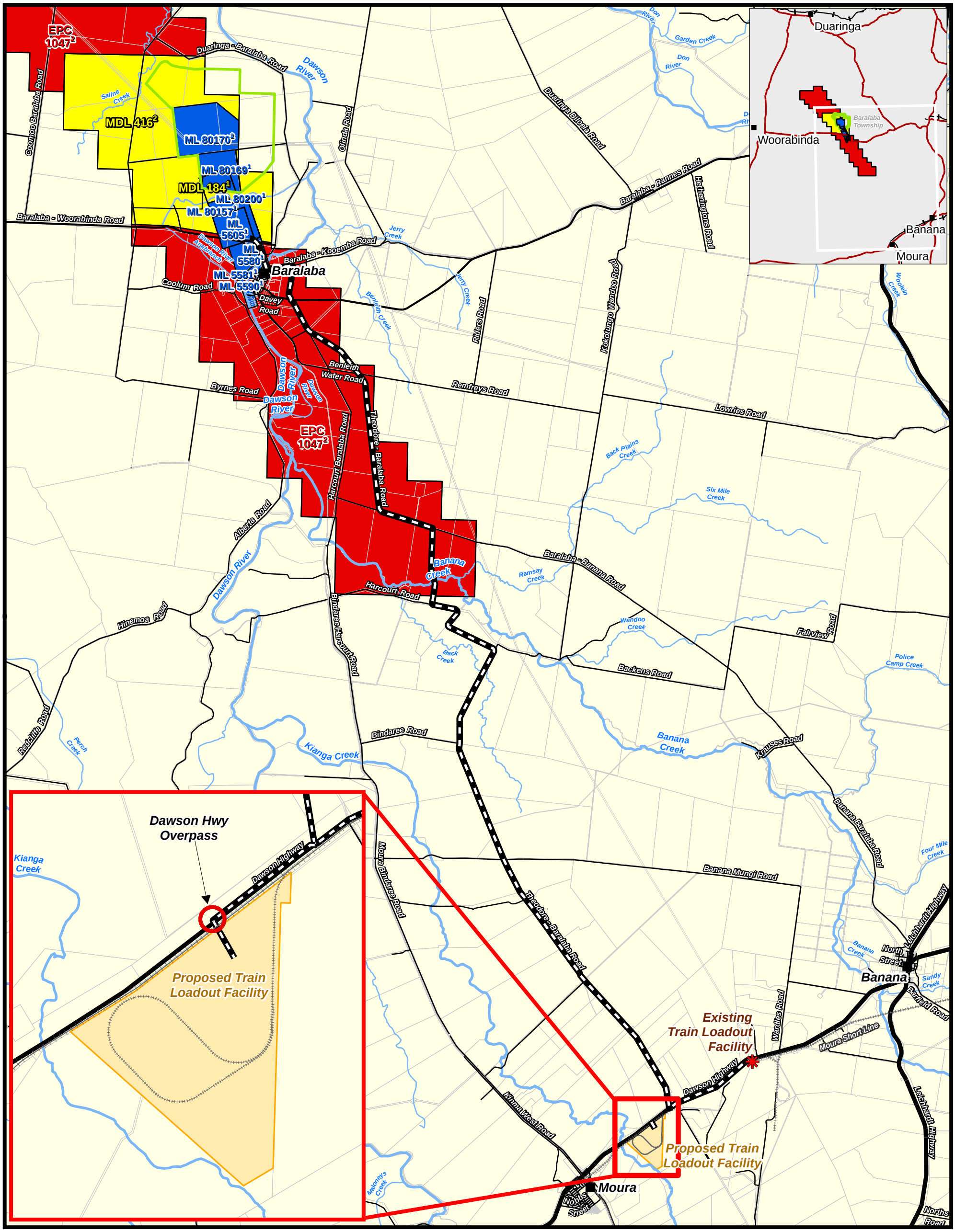
- provide an overview of the terrestrial flora and vertebrate fauna characteristics of the BNCOP locality;
- describe the likely adverse impacts on terrestrial flora and vertebrate fauna arising from the BNCOP;
- describe measures that would be implemented to avoid and mitigate impacts on terrestrial flora and vertebrate fauna; and
- describe an offset and rehabilitation strategy to address significant residual potential impacts of the BNCOP on terrestrial flora and vertebrate fauna.

This terrestrial ecology assessment was peer reviewed by Professor David Goldney (Cenwest Environmental Services).

Specific State Considerations

This assessment has been prepared in consideration of the *Terms of Reference for the Baralaba North Continued Operations Project Environmental Impact Statement* (ToR for the BNCOP). The ToR for the BNCOP outlines the following information requirements for flora and fauna:

- *Describe the likely impacts on the biodiversity and natural environmental values of affected areas arising from the construction, operation and eventual decommissioning of the project (where known). Take into account any proposed avoidance and/or mitigation measures. The assessment should include, but not be limited to, the following key elements:*
  - *matters of state environmental significance and national environmental significance (if applicable);*
  - *terrestrial and aquatic ecosystems (including groundwater-dependent ecosystems) and their interaction;*
  - *biological diversity including listed flora and fauna species and regional ecosystems (a Property Map of Assessable Vegetation application under the Vegetation Management Act 1999 should be lodged separately if the EIS identifies inaccuracies in the Regional Ecosystem mapping);*



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TITLE **Figure 4** **Product Road Transport Route**	REV	DESCRIPTION	DATE	SCALE **1:175,000**	CURRENT ISSUE SIGNATURES	
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Legend

- Road
- Watercourse
- Cadastre
- Cockatoo Coal ML
- Cockatoo Coal MDL
- Cockatoo Coal EPC
- Railway
- Product Road Transport Route.
- Existing Train Loadout Facility.
- Proposed Train Loadout Facility.
- BNCOP Operational Land

Cockatoo Coal Limited

STATUS **FINAL**

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  - *the integrity of ecological processes, including habitats of threatened, near-threatened or special least-concern species;*
  - *the integrity of landscapes and places, including wilderness and similar natural places;*
  - *impact of waterway barriers on fish passage in significant waterways;*
  - *chronic, low-level exposure to contaminants or the bio-accumulation of contaminants; and*
  - *impacts on native fauna due to wastes at the site, particularly those related to any form of toxicants in supernatant water of any tailings storage facility* [note: there are no tailings storage facilities proposed as part of the BNCOP].

- *Describe any actions of the project that require an authority under the Nature Conservation Act 1992, and/or would be assessable development for the purposes of the Vegetation Management Act 1992[2] (VMA) and/or the Fisheries Act 1994.*
- *Propose practical measures for protecting or enhancing natural values, and assess how the nominated quantitative indicators and standards may be achieved for nature conservation management. In particular, address measures to protect or preserve any threatened or near-threatened species.*
- *Specifically address any obligations imposed by State or Commonwealth legislation or policy or international treaty obligations, such as the China–Australia Migratory Bird Agreement, Japan–Australia Migratory Bird Agreement, or Republic of Korea–Australia Migratory Bird Agreement.*
- *Assess the need for buffer zones and the retention, rehabilitation or planting of movement corridors, and propose measures that would avoid the need for waterway barriers, or propose measures to mitigate the impacts of their construction and operation* [note: there are no waterway barriers proposed as part of the BNCOP]*. The measures proposed for the progressive rehabilitation of disturbed areas should include rehabilitation success criteria in relation to natural values that would be used to measure the progress.*
- *Describe how the achievement of the objectives would be monitored and audited, and how corrective actions would be managed. Proposals for the rehabilitation of disturbed areas should incorporate, where appropriate, provision of nest hollows and ground litter.*
- *Where Queensland legislation or a specific-issue offset policy requires an offset for a significant residual impact on a particular natural environmental value, the offset proposal(s) shall be presented in a form consistent with relevant legislation and policy.*
- *The proposed offsets should be consistent with the requirements set out in any applicable legislation or specific-issue offset policies.*

This assessment addresses the above information requirements, with the exception that this assessment does not cover likely adverse impacts on aquatic ecology (e.g. impact of waterway barriers on fish passage) and matters under the Qld *Fisheries Act 1994*. A separate aquatic ecology impact assessment has been prepared by frc environmental (2014).

Specific Commonwealth Considerations

On 24 October 2013, the BNCOP Action Area was referred under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2013/7036). The BNCOP Action is separate from, but related to, the existing Baralaba Coal Mine and the approved Baralaba North/Wonbindi North Mine. The description of the BNCOP Action Area differs slightly from the BNCOP description (e.g. the BNCOP Action Area includes some land in the approved Baralaba North/Wonbindi North Mine footprint – Figure 2).

[2] This is notwithstanding that the Qld *Vegetation Management Act 1999* does not apply to mining projects.

On 12 December 2013, a delegate of the Commonwealth Minister for the Environment declared the BNCOP to be a 'controlled' action for the purpose of the EPBC Act due to potential impacts on the following controlling provisions under Part 3 of the EPBC Act:

- listed threatened species and communities (sections 18 and 18A of the EPBC Act); and
- water resources (sections 24D and 24E of the EPBC Act).

The BNCOP is to be assessed under the assessment bilateral agreement with Qld. Accordingly, this document provides an assessment on the relevant listed threatened species and communities (sections 18 and 18A of the EPBC Act). The assessment has been prepared in consideration of the:

- ToR for the BNCOP (specifically Appendix 2 of the ToR for the BNCOP, titled *Matters of National Environmental Significance*);
- *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Department of the Environment [DotE], 2013a);
- *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (Department of Sustainability, Environment, Water, Population and Communities [SEWPaC, 2011a); and
- other relevant guidelines/policies.

This document provides additional information which was not provided in the EPBC Act referral (24 October 2013), including further flora and fauna surveys, impact avoidance measures, mitigation measures and offset measures.

A separate report, the *BNCOP EPBC Act Controlling Provisions Assessment* (Resource Strategies Pty Ltd, 2014), has been prepared which brings together assessments of impacts and mitigation for the controlling provisions and addresses the DotE (2014a) requirements. Potential impacts on water resources are summarised in the *BNCOP EPBC Act Controlling Provisions Assessment* (Resource Strategies Pty Ltd, 2014) and addressed by the *Baralaba North Continued Operations Project Groundwater Model and Assessment* (HydroSimulations, 2014).

1.2 LOCATION DEFINITIONS

The follow locations are referred to in this document:

The **BNCOP Operational Land** is the area subject to the EIS which includes the approved Baralaba North/Wonbindi North Mine footprint and the **BNCOP Additional Footprint** (Figure 2).

The **BNCOP Additional Footprint** is the BNCOP Operational Land outside of the approved Baralaba North/Wonbindi North Mine (Figure 2).

The **BNCOP Action Area** is the area referred under the EPBC Act and subject to the controlling provisions (Figure 2). The BNCOP Action Area is used in this document when discussing Matters of National Environmental Significance.

The **BNCOP locality** is the general location of the BNCOP and surrounding land.

2 EXISTING ENVIRONMENT

2.1 REGIONAL SETTING

The BNCOP is located approximately 115 km south-west of Rockhampton, in the lower (south-east) Bowen Basin region of central Qld. The BNCOP is located within the north-eastern part of the Brigalow Belt South Bioregion as defined by the Interim Biogeographic Regionalisation for Australia (IBRA) (DotE, 2014a) (Figure 5)[3]. The boundary of the Dawson River Downs IBRA subregion and Woorabinda IBRA subregion runs through the BNCOP Operational land (DotE, 2014a).

The BNCOP is located in an extensively cleared agricultural landscape. In fact, the Brigalow Belt Bioregion in Qld has the second lowest remaining vegetation for a region in Qld with 41.6 percent (%) of the original vegetation remaining (Accad *et al.,* 2013). Notwithstanding, the Dawson Range is a prominent (vegetated) feature in the region approximately 10 km to the west of the BNCOP, as is the Dawson River which is approximately 1 km to the east of the BNCOP (Figure 6). The native vegetation associated with these features is recognised as part of a Bioregional Corridor (Qld Department of Environment and Heritage Protection [DEHP], 2009) (Figure 6).

2.2 CLIMATE

The climate of the Brigalow Belt South Bioregion is hot to warm, sub-humid and rainfall is summer-dominant (Bastin and the ACRIS Management Committee, 2008). Monthly average daily maximum temperatures as well as daily minimum temperatures and humidity for the Baralaba Post Office (39004) meteorological station are provided in Table 1. The Baralaba Post Office (39004) is the closest Bureau of Meteorology (BoM) meteorological station to the BNCOP (BoM, 2013).

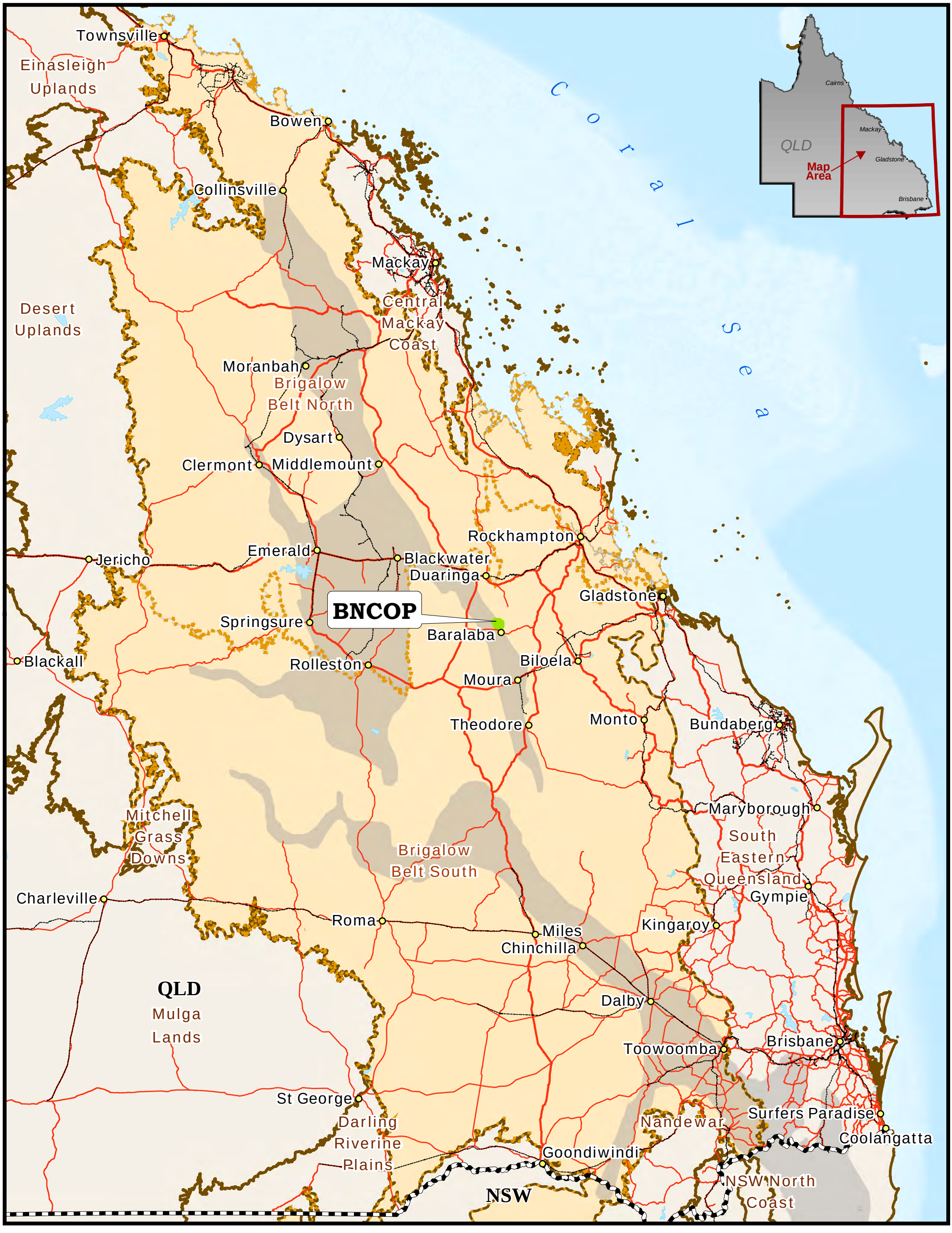
Rainfall records at the Baralaba Post Office (39004) indicate the average annual rainfall is 714 millimetres (mm) (Table 1). Average daily temperatures are warmest during the summer months (up to 34.3 degree Celsius [^{o}C]) and coolest in the winter months (down to 7.4 ^{o}C) (Table 1).

Table 1
Meteorological Summary – Average Rainfall, Temperature and Humidity

Period of Record	Average Monthly Rainfall (mm)	Average Daily Temperature (^{o}C) [Minimum-Maximum]	Average Monthly Humidity (%) [9.00 am to 3.00 pm]
	1927-2013	**1966-2012**	**1969-2010**
January	96.2	21.3-34.3	65-43
February	115.6	21.2-33.4	69-46
March	75.0	19.3-32.5	67-41
April	44.8	16.0-30.3	67-42
May	41.7	12.2-26.5	69-42
June	34.9	8.9-23.5	74-46
July	28.6	7.4-23.1	70-40
August	22.1	8.6-25.2	66-38
September	24.8	11.9-28.4	62-34
October	55.7	15.6-31.2	60-35
November	76.1	18.4-32.8	60-38
December	101.8	20.3-34.0	62-40
Annual Average	***714 [717.3]***	***15.1-29.6***	***66-40***

Source: BoM (2013).

[3] Under the regional ecosystem framework, the Brigalow Belt Bioregion consists of the Brigalow Belt North IBRA Bioregion and Brigalow Belt South IBRA Bioregion.



PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

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DATA SOURCES:
VECTOR DATA:
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Legend
Populated Place.....
Road.....
Rail.....
Watercourse.....
Brigalow Belt Bioregion (North and South)....
Other Bioregion.
Coal Basin.....
BNCOP Operational Land.

TITLE

Figure 5 Brigalow Belt Bioregion

REV	DESCRIPTION	DATE
0	Original map output	11/12/13
3	Update Data	13/03/14
4	Update Data	04/04/14

SCALE **1:3,300,000**
SIZE A3
DATUM GDA 94
PROJECTION MGA Zone 55

CURRENT ISSUE SIGNATURES

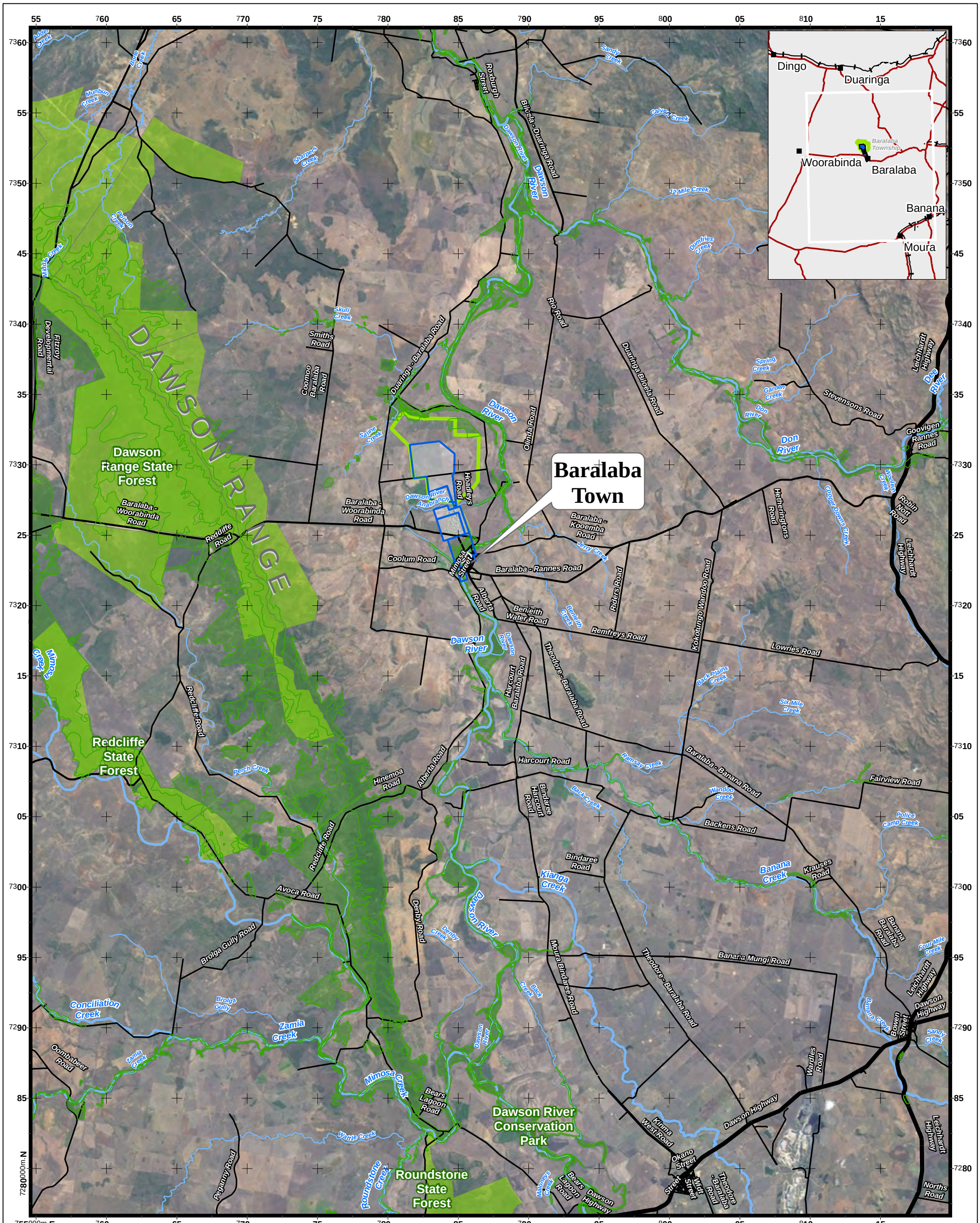
DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

Cockatoo Coal Limited

STATUS **FINAL**

PROJECT NO Baralaba Nth
DRAWING NO BBN-098-19-04-140404

Path: N:\Baralaba\Baralaba_North\PROJECTS\1403\BBN_098_140121_EIS_AppA_Terrestrial_Ecology\BBN_098_19_04_140404_EIS_Brigalow_Belt_A3P.mxd



PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.	N 0 2 4 6 8 10 Kilometres	DATA SOURCES: RASTER DATA: ESRI,DIGITALGLOBE, GEOEYE, I-CUBED, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA DEHP, 2009 *NOTE:* *1 : HELD BY BARALABA COAL PTY LTD* *2 : HELD BY WONBINDI COAL PTY LTD* *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.* **Legend** Road..... Watercourse..... Cockatoo Coal ML..... Existing Operational Land..... BNCOP Operational Land..... State Forest..... **Biodiversity Significance** Regional Biodiversity Corridor	Cockatoo Coal Limited

TITLE	REV	DESCRIPTION	DATE	SCALE	CURRENT ISSUE SIGNATURES	
Figure 6: Bioregional Corridors	0	Original map output	23/01/14	**1:250,000**		
	2	Data Updates	25/02/14	SIZE A3	DRAWN	MJS
	3	Data Updates	07/04/14	DATUM GDA 94	CHECKED	BJD
				PROJECTION MGA Zone 55	APPROVED	BJD

STATUS	
FINAL	
PROJECT NO	DRAWING NO
Baralaba Nth	BBN-098-01-04-140407

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On 1 March 2014, areas within the Central Highlands Regional LGA (including the Baralaba Coal Mine and surrounding area) were drought declared.

2.3 TOPOGRAPHY

The topography of the Baralaba area is dominated by the Dawson River floodplain. The area is relatively flat with only slight undulation. Ground elevations range between 75 and 105 metres (m) Australian Height Datum (AHD). The landscape contours are shown on the fauna habitat figure in Section 4.4.1.

2.4 HYDROLOGY

From a hydrological perspective, the BNCOP is situated in the Lower Dawson Sub-catchment Area of the Fitzroy Basin. It is located west of the Dawson River and north of the Dawson River Anabranch (Figure 7). Surface water from part of the eastern side of the Dawson Range drains to the Dawson River (Figure 7). The Dawson River is a perennial river that flows to the Fitzroy River, which flows to the Coral Sea (Figure 1).

Various palustrine wetlands[4] are present in the landscape (Figure 7). To the north of the BNCOP Operational Land, there is a palustrine wetland associated with the relict drainage line of the Dawson River (Figure 7). This wetland is mostly perennial, though it changes in size due to rainfall. During periods of flood, water from Saline Creek flows to the palustrine wetland.

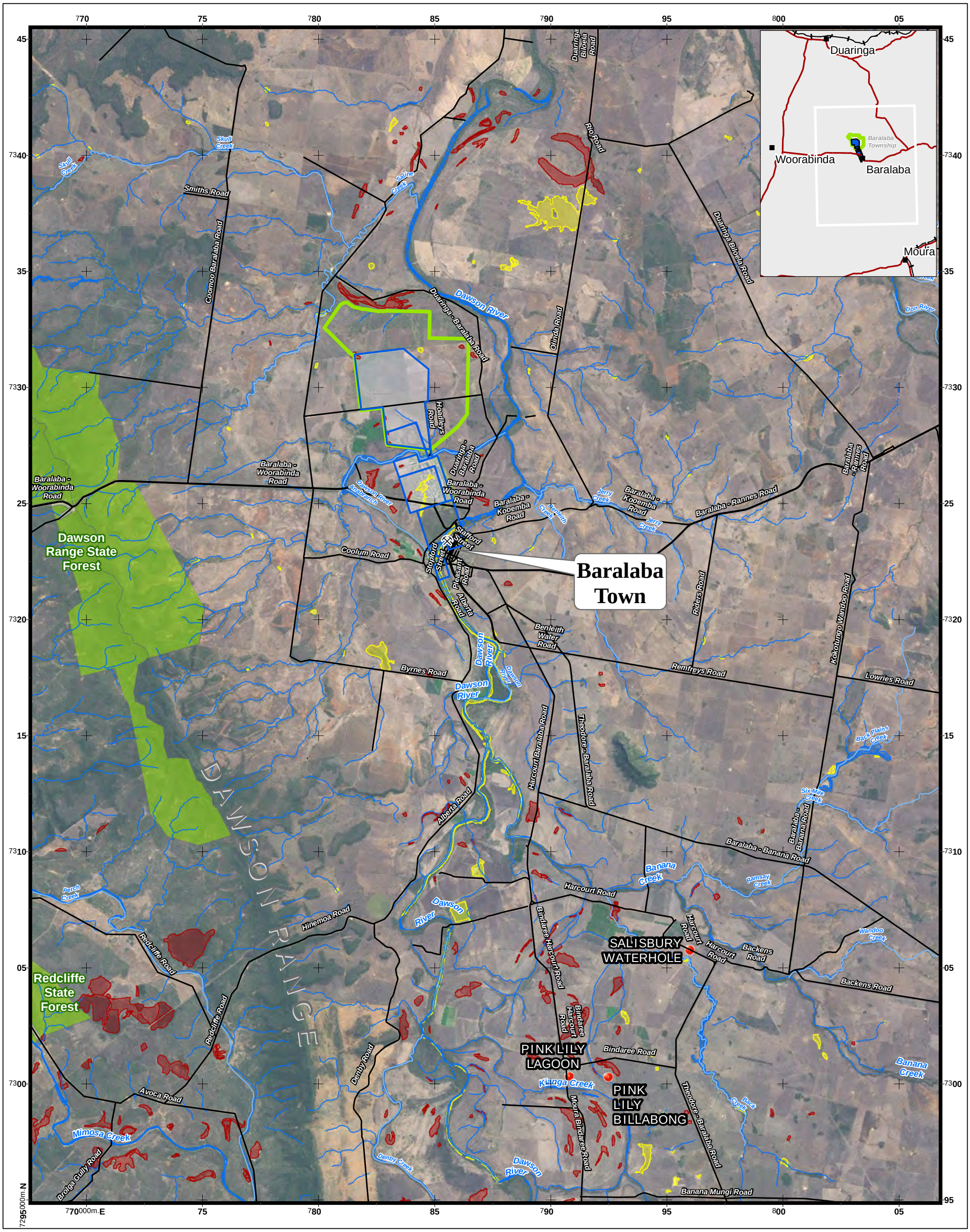
Inside the BNCOP Operational Land (and Existing Operational Land), most of the palustrine wetlands are ephemeral, with only the farm dams being a permanent source of water. As part of the approved Baralaba North/Wonbindi North Mine, a 200 m buffer of mostly cleared land has been established around a palustrine wetland inside the BNCOP Operational Land (and Existing Operational Land). This palustrine wetland is named the North-west Soak and is further discussed in Section 4.4.2 (Figure 2). This would be maintained as part of the BNCOP.

A first order watercourse occurs in the north of the BNCOP Additional Footprint on the vegetation management watercourse map (Section 4.4.2) (DEHP, 2014a). This watercourse is ephemeral and non-distinctive (e.g. no defined channel).

Wetlands of high aquatic value under the schedules of the Sustainable Planning Regulation 2009 are identified as Wetland Protection Areas on maps of referable wetlands. There is one wetland protection area (high ecological significant wetland north [HESN]) in the BNCOP Operational Land, in the north-east corner; there is also one wetland protection area in the same general location outside the BNCOP Operational Land boundary (Figure 7).

A separate aquatic ecology impact assessment for the BNCOP has been prepared by frc environmental (2014).

[4] Palustrine wetlands are '*vegetated, non-riverine or non-channel systems. They include billabongs, swamps, bogs, springs, soaks etc. and have more than 30% emergent vegetation* (DEHP, 2014a)'.



PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.			N 0 1 2 3 4 5 Kilometres		DATA SOURCES: RASTER DATA: ESRI,DIGITALGLOBE, GEOEYE, I-CUBED, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA. DEHP, 2014 *NOTE:* *1 : HELD BY BARALABA COAL PTY LTD* *2 : HELD BY WONBINDI COAL PTY LTD* *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.* **Legend** Road..... Watercourse..... Cockatoo Coal ML..... Existing Operational Land..... BNCOP Operational Land..... **Wetland Regional Ecosystems** Riverine..... Lacustrine..... Palustrine.....	
TITLE **Figure 7:** **Wetlands and Watercourses**	REV	DESCRIPTION	DATE	SCALE **1:150,000**	CURRENT ISSUE SIGNATURES	
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	4	Text Updates	04/04/14	PROJECTION MGA Zone 55	APPROVED	BJD
						STATUS **FINAL**
						PROJECT NO Baralaba Nth / DRAWING NO BBN-098-02-04-140404

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2.5 LAND ZONES AND SOILS

Land zones are “categories that describe the major geologies and associated landforms and geomorphic processes of the State of Queensland” (DEHP, 2014b). The Land Zones in the BNCOP locality are (after DEHP, 2014b and Queensland Herbarium, 2013):

- (3) Alluvium (River and Creek Flats);
- (4) Clay Plains not Associated with Current Alluvium; and
- (5) Old Loamy and Sandy Plains. These land zones are used in the regional ecosystem classification (Section 4.2.2).

A Soil and Land Suitability Assessment has been prepared for the BNCOP by Soil Mapping and Monitoring (2014) in which 23 soil types were recognised and mapped within the BNCOP locality. Alluvial soils are associated with the lowest terraces and floodplains of the Dawson River Anabranch and recent alluvium along tributaries of the Dawson River, particularly Saline Creek. Cracking clay soils occur on the upper terraces and floodplains of the Dawson River system, while sandy or loamy surfaced profiles that occupy high level, elevated alluvium found on relict levees and scroll plains.

Soils occupying level to gently undulating plains developed on older unconsolidated Cainozoic sediments are quite extensive (Soil Mapping and Monitoring, 2014). As are soils in undulating landscapes developed on *in situ* Tertiary sandstones in the north of the survey area. Small occurrences of other soils are those in the transitional between the more recent floodplain landscapes and the older elevated Cainozoic surface as well as soils possibly related to outcropping calcareous sediments (Soil Mapping and Monitoring, 2014).

2.6 LAND USE

Land in the Baralaba district is predominately used for rural activities including dairy farming, beef cattle grazing and fattening, and limited crop cultivation. The Dawson Range State Forest and Redcliffe State Forest occur approximately 10 km and 25 km to the west of the BNCOP (Figure 6).

With the exception of easements for local government roads (Central Highlands Regional Council) and powerlines (Powerlink), all other lots within the BNCOP Operational Land are freehold/leasehold used for rural activities. Existing infrastructure in the BNCOP Additional Footprint includes: farm dams, fencing, access tracks and transmission lines (Attachment A).

As described in Section 1, CCL operates the existing Baralaba Coal Mine (ML80157 and ML5605) and the approved Baralaba North/Wonbindi North Mine (ML80169 and ML80170) (Figure 2). There are no other existing coal mines nearby. The nearest operating coal mine in the region is the Dawson Mine located approximately 45 km south-east of the BNCOP. The Dawson Mine is operated and managed by Anglo American.

3 DATA SOURCES

3.1 RELEVANT DATABASES

The following database and data sources were reviewed for records of conservation significant flora and fauna in the BNCOP Additional Footprint and wider landscape:

- *BirdLife Australia Database* for an 80 km search radius around the BNCOP (BirdLife Australia, 2014).
- *Wildlife Online* for a 20 km search radius around the BNCOP (DEHP, 2014c).
- *HERBRECS Database* for a 50 km search radius around the BNCOP (Queensland Herbarium, 2014).
- *Queensland Museum Database* for an 80 km search radius around the BNCOP (Queensland Museum, 2014).
- *Atlas of Living Australia* for an 80 km search radius around the BNCOP (Atlas of Living Australia, 2014).
- *EPBC Act Protected Matters* for a 10 km search radius around the BNCOP (DotE, 2014b).

The summarised results of the database review are provided in Attachment B.

The following database and data sources were reviewed for other ecological data relevant to the BNCOP Additional Footprint:

- *Bioregional Planning Assessment – Brigalow Belt, Version 1.3* (DEHP, 2009).
- *Regulated Vegetation Management Map* (Department of Natural Resources and Mines [DNRM], 2014).
- *Vegetation Management – Essential Habitat Map, Version 4* (DNRM, 2013).
- *Environmentally Sensitive Area Map* (DEHP, 2014d).
- *Groundwater Dependent Ecosystem Mapping* (BoM, 2014).
- *Wetland Mapping – Baralaba 100K Map Tile – 8849* (DEHP, 2014a).
- *Referrable Wetland Mapping* (DEHP, 2014e).

3.2 RELEVANT LITERATURE

There are no specific region-wide flora and fauna surveys covering the BNCOP locality (other than the information contained within the databases listed in Section 3.1). However, the Brigalow Belt Bioregion contains the highest number of systematic survey sites in Qld (many in relation to development Projects) (Smith, 2013).

On a local scale, CCL commissioned RPS Australia East to undertake the *Baralaba North Continued Operations Project Terrestrial Ecology Post Summer and Post Winter Baseline Survey Report* (RPS Australia East, 2014) and the report is provided in Attachment A. Footprints Environmental Consultants was also commissioned to provide predictive mapping for the Ornamental Snake (*Denisonia maculata*) from the *Assessment of Seasonal Habitat Characteristics as Predictors of Habitat Suitability for the Threatened Ornamental Snake ACARP Project C15044* (Footprints Environmental Consultants, 2011a).

Other relevant literature sources include:

- *Baseline Fauna Surveys and Management Plans for Baralaba North and Wonbindi North Coal Mines* (Footprints Environmental Consultants, 2011b).
- *Baralaba Coal Mine Extension - Baralaba North and Wonbindi North: Terrestrial Flora Initial Survey* (QTree, 2011).
- Recent Studies for Other Environmental Impact Statements *(Minyango Central Project Environmental Impact Statement; Ensham Environmental Impact Statement and Springsure Environmental Impact Statement*).
- Threatened Species Information.
- Other Environmental Studies.

An overview of the above literature is provided in the subsections below.

3.2.1 BNCOP Terrestrial Ecology Survey Report (RPS Australia East, 2014)

RPS Australia East (2014) (Attachment A) undertook flora and fauna surveys covering the BNCOP Additional Footprint and surrounding land between 12 and 21 April 2013 (autumn) and 19 and 29 October 2013 (spring). An outline of the surveys is provided below and the detailed survey report is provided in Attachment A.

Flora Surveys

Flora surveys were undertaken in consideration of the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2)* (Nelder *et al*., 2012). An overview of the flora survey methods is provided in Table 2 and detailed in Attachment A.

Table 2
Overview of Flora Survey Methods

Survey Technique	Description
Tertiary Sites[1]	17 Tertiary Sites were sampled.
Quaternary Sites[2]	39 Quaternary Sites were sampled.
Vegetation Mapping	Existing DEHP regional ecosystem Mapping for the BNCOP Additional Footprint and surrounding land was ground-truthed based on the regional ecosystem Description Database (DEHP, 2014f).
Classification of Threatened Ecological Communities	Identification of threatened ecological communities listed under the EPBC Act was based on the following guidelines/advice: • *Brigalow (Acacia harpophylla dominant and co-dominant) Species Profile and Threats Database* (DotE, 2014c); • *Brigalow (Acacia harpophylla dominant and co-dominant) Information Sheet* (SEWPaC, 2003); • *Approved Conservation Advice for Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions Ecological Community* (SEWPaC, 2011b); • *Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions Profile and Threats Database* (DotE, 2014c); and • *Commonwealth Listing Advice for Weeping Myall Woodlands Ecological Community* (SEWPaC, 2008).

Table 2 (Continued)
Overview of Flora Survey Methods

Survey Technique	Description
BioCondition Assessment	Ecological condition was assessed at each tertiary site (17) in accordance with the *Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Version 2.1)* (Eyre *et al*., 2011), referred to as the BioCondition assessment methodology.
Targeted Searches for Threatened Species/Meanders	Targeted searches for threatened species were undertaken in an area of approximately 1 ha around each Tertiary Site and Quaternary Site (n=56) as well as opportunistically across the study area in suitable habitat.

Source: Attachment A.

[1] Tertiary Sites - *Data collected include all location, environmental and overall structural information as well as a comprehensive list of woody species and basal area measure of abundance (of woody stems using the Bitterlich stick method)* (Nelder *et al*., 2012).

[2] Quaternary Sites - *Data are used primarily as a record of field traverses and to verify regional ecosystem/vegetation mapping* (Nelder *et al*., 2012).

Attachment C provides a review of the conservation significant flora species relevant to the BNCOP (produced from the database searches in Attachment B).

Vertebrate Fauna Surveys

Vertebrate fauna surveys were undertaken in consideration of the following guidelines:

- *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre *et al.,* 2013).
- *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a).
- *Survey Guidelines for Australia's Threatened Reptiles* (Department of Environment, Water, Heritage and the Arts [DEWHA], 2011a).
- *Survey Guidelines for Australia's Threatened Bats* (DEWHA, 2010a).
- *Survey Guidelines for Australia's Threatened Birds* (DEWHA, 2010b).
- *Survey Guidelines for Australia's Threatened Mammals* (DEWHA, 2011b).
- *Draft EPBC Act Referral Guidelines for the Vulnerable Koala (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)* (DotE, 2013b).
- *Targeted Species Survey Guidelines: Little Pied Bat* (Department of Science, Information, Technology, Innovation and the Arts [DSITIA], 2012).

An overview of the vertebrate fauna survey methods is provided in Table 3 and detailed in Attachment A.

Table 3
Overview of Fauna Survey Methods

Survey Technique	Description
Elliott A Traps	Ten to 18 Elliott A traps were set at each of the six trapping sites for four to six nights. The effort was repeated over the two survey periods for a total of 908 trap nights.
Elliott B Traps	Two to ten Elliott B traps were set at each of the six trapping sites for four to six nights. The effort was repeated over the two survey periods for a total of 288 trap nights.
Cage Traps	One cage trap was set at each of the six trapping sites for four to six nights. The effort was repeated over the two survey periods for a total of 60 trap nights.
Pitfall Traps	Four to six pitfall traps were set at each of the six trapping sites for four to six nights. The effort was repeated over the two survey periods for a total of 312 trap nights.
Funnel Traps	Five to eight funnel traps were set at each of the six trapping sites for four to six nights. The effort was repeated over the two survey periods for a total of 364 trap nights.

Table 3 (Continued)
Overview of Fauna Survey Methods

Survey Technique	Description
Harp Traps	Two to three harp traps were set in flyways. The effort was repeated over the two survey periods for a total of 64 harp-trap nights.
Bat Detection Devices	One or two Anabat metres were set in flyways for two to three nights. The effort was repeated over the two survey periods for a total of 77 survey nights.
Motion Detection Cameras	One to two motion detection cameras were set at each of the six trapping sites (except one site in the autumn survey). The effort was repeated over the two survey periods for a total of 78 survey nights.
Spotlighting	Spotlighting was undertaken over six nights in the autumn survey and seven nights in the spring survey. Spotlighting was undertaken for 1-2 hours per night on foot and via vehicle. A total of 58 hours of spotlighting was undertaken throughout the study area.
Diurnal Bird Surveys	A total of 31 hours (autumn survey) and 28.5 hours (spring survey) of active bird searches were undertaken throughout the study area at trapping sites and other sites.
Active Searches	A total of 41 hours (autumn survey) and 28.5 hours (spring survey) of active diurnal searches were conducted within suitable habitat within the study area for reptiles and secondary evidence of fauna (nests, scats, tracks, bones etc).
Call Playback	Call playback was undertaken for the Koala within suitable habitat (repeated 12 times in autumn and spring).
Habitat Assessment	The following habitat features were recorded within 10 x 10 m quadrats throughout the study area (13 in autumn and 27 in spring): • type and condition of vegetation; • dominant tree species and canopy cover; • presence/absence of large remnant trees; • density, size and height of hollows in trees and/or stags; • density of fallen logs, hollowed stumps and/or stags; • abundance of woody debris; • presence/absence of decorticating bark; • density and description of groundcovers, including litter, tussocks, logs; rocks and cryptograms; • presence/absence of rocks, caves, boulders etc; • description of gilgai, where present; • types and level of disturbance; • burrow abundance; • description of soil; • proximity to and description of closest water source; and • habitat patch area and connectivity.

Source: Attachment A.

Targeted Searches for Conservation Significant Fauna Species

Attachment B provides a list of conservation significant fauna species from the database searches (Section 3.1). Attachment C provides a review of those species (in Attachment B) and identifies which were specifically targeted during the surveys by RPS Australia East (2014) (Attachment A). Table 4 also lists the species that were targeted during the surveys by RPS Australia (2014) (Attachment A) and provides a reconciliation of the survey methods against the recommended State and Commonwealth survey methods.

In addition to the species listed in Table 4, the Square-tailed Kite (*Lophoictinia isura*) may be sighted on occasion in the BNCOP locality (though it was not recorded during diurnal bird surveys or active searches for nests). This species is not considered further in this assessment given the suboptimal habitat in the BNCOP Additional Footprint which is a minor component of the species potential habitat (the species is highly mobile with a large hunting range [of more than 100 km^2]).

Table 4
Targeted Searches for Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Recommended Survey Method	Survey Method (Attachment **A**)	Survey Deemed Adequate by RPS Australia (2014) (Attachment **A**)
		NC Act	EPBC Act			
Reptiles						
Delma torquata	Collared Delma	V	V	*Appropriate survey methods for this species are one-off hand searches (including raking through leaf litter) in appropriate habitats, together with pitfall trapping during late spring to summer. A series of pitfall trap lines comprising six 4–10 litre buckets and funnel traps spread along a 15 metre fence would be an appropriate trap design* (DEWHA, 2011a).	RPS Australia East (2014) (Attachment A) undertook active searching, pitfall trapping and funnel trapping.	Yes.
Paradelma orientalis	Brigalow Scaly-foot	V	-	*The most appropriate survey method for this species combines diurnal hand-searches under rocks, fallen bark and timber and raking through piles of leaf litter with nocturnal spotlight searches on the ground as well as lower trunks of rough-barked, sap-exuding trees on warm nights, in appropriate habitats. A drift fence array with funnel traps is also a useful survey technique* (DEWHA, 2011a).	RPS Australia East (2014) (Attachment A) undertook active searching, pitfall trapping and funnel trapping.	Yes.
Egernia rugosa	Yakka Skink	V	V	*Searching for burrow systems and communal defecation sites is the most reliable method of detection. The species can be confirmed by Elliott trapping around the burrows, by distant observation with binoculars or by shining a torch down the burrows at night* (DEWHA, 2011a).	RPS Australia East (2014) (Attachment A) undertook active searching and Elliot trapping.	Yes.
Denisonia maculata	Ornamental Snake	V	V	*The species is most likely to be encountered by searching around suitable gilgai habitat while frogs are active. Driving roads at night, particularly after wet weather when frogs are active, may be necessary if wet weather precludes access to suitable (gilgai) habitat. Diurnal searches under sheltering sites (rocks, logs or other large objects on the ground) could also be employed. Pitfall and funnel trap arrays could be trialled* (DEWHA, 2011a). The *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a) also adds that one-off diurnal searches and spotlighting should be undertaken over a minimum of 1.5 person hours per hectare for habitats of average complexity per targeted species over a minimum of 3 days.	RPS undertook 41 hours diurnal active searches in the autumn survey and 28.5 hours diurnal active searches in the spring survey to target the Ornamental Snake. RPS also undertook 22 person hours of spotlighting in the autumn survey and 36 person hours of spotlighting in the spring survey. Diurnal searches and spotlighting were undertaken over the two survey periods which exceeded the three day survey period minimum (e.g. spotlighting was over 13 nights).	Yes.

Table 4 (Continued)
Targeted Searches for Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Recommended Survey Method	Survey Method (Attachment A)	Survey Deemed Adequate by RPS Australia (2014) (Attachment A)
		NC Act	EPBC Act			
Reptiles (Cont.)						
Denisonia maculate (Cont.)	Ornamental Snake				Pitfall trapping and funnel trapping was also undertaken. 192 pitfall trap nights were undertaken in the autumn survey and 120 pitfall trap nights in the spring survey. 216 funnel trap nights were undertaken in the autumn survey and 148 funnel trap nights in the spring survey. The method recommended was trialled and subsequently the Ornamental Snake was captured (Section 4.4.4).	
Furina dunmalli	Dunmall's Snake	V	V	*Recommended methods are active searching of sheltering sites (under large objects on the ground such as rocks, logs or human-made debris), pitfall trapping, or road driving at night (particularly after wet weather)* (DEWHA, 2011a).	RPS Australia East (2014) (Attachment A) undertook active searching, pitfall trapping and spotlighting. Following the field survey, it was concluded that this species is unlikely to occur as the elevation is too low (this species prefer habitat 200 to 500 m AHD [DotE,2014b]). This species is not considered further in this assessment.	Yes.
Birds						
Nettapus coromandelianus	Cotton Pygmy-goose	NT	-	-	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys.	Yes.
Ephippiorhynchus asiaticus	Black-necked Stork	NT	-	-	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys.	Yes.
Erythrotriorchis radiatus	Red Goshawk	E	V	Areas searches and diurnal bird surveys (DEWHA, 2010b).	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys and searches. Following the field survey, it was concluded that habitat for this species, especially nesting habitat, is limited within the study area. This species is not considered further in this assessment.	Yes.
Turnix melanogaster	Black-breasted Button-quail	V	V	*Searches of suitable habitat with detection of flushing birds or hearing of foraging scratching* (DEWHA, 2010b).	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys. Following the field survey, it was concluded that this species is unlikely to occur due to no suitable habitat being present (Attachment A). This species is not considered further in this assessment.	Yes.

Table 4 (Continued)
Targeted Searches for Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Recommended Survey Method	Survey Method (Attachment **A**)	Survey Deemed Adequate by RPS Australia (2014) (Attachment **A**)
		NC Act	EPBC Act			
Birds (Cont.)						
Rostratula australis	Australian Painted Snipe	V	E	*Area searches or transects through suitable wetlands; detection by sighting and flushing. Targeted stationary observations at dawn and dusk of suitable foraging locations within wetlands; detection by sighting* (DEWHA, 2010b).	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys.	Yes.
Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	V	V	*Area searches or transect surveys in suitable habitat. Flushing surveys also likely to be useful.*	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys.	Yes.
Melithreptus gularis	Black-chinned Honeyeater	NT	-	-	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys.	Yes.
Neochmia ruficauda ruficauda	Star Finch	E	E	*Area searches or transect-point surveys in suitable habitat, such as rank grasses in riparian areas with pandanus or corypha palm. Also check within flocks of other finches. Detection by calls and sighting. Broadcast (playback) surveys may be useful, especially in the morning and evening. Targeted searches and subsequent watches of waterholes may also be useful in the dry season.*	RPS Australia East (2014) (Attachment A) undertook diurnal bird surveys.	Yes.
Mammals						
Tachyglossus aculeatus	Short-beaked Echidna	SLC	-	-	RPS Australia East (2014) (Attachment A) undertook active searching.	Yes.
Dasyurus hallucatus	Northern Quoll	-	E	Cage trapping, Elliot trapping and motion detection cameras (DEWHA, 2011b).	RPS Australia East (2014) (Attachment A) undertook cage trapping, Elliot trapping and motion detection cameras. Following the field survey, it was concluded that this species is unlikely to occur due to no suitable habitat (Attachment A). This species is not considered further in this assessment.	Yes.
Phascolarctos cinereus	Koala	SLC	V	Diurnal (daytime) searching, nocturnal spotlighting, call playback and remote sensor activated cameras (DotE, 2013b).	RPS Australia East (2014) (Attachment A) undertook diurnal searching, nocturnal spotlighting and call playback.	Yes.

Table 4 (Continued)
Targeted Searches for Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Recommended Survey Method	Survey Method (Attachment A)	Survey Deemed Adequate by RPS Australia (2014) (Attachment A)
		NC Act	EPBC Act			
Mammals (Cont.)						
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	Bat detection devices and harp trapping (DEWHA, 2010a).	RPS Australia East (2014) (Attachment A) undertook surveys for this species using bat detection devices and harp trapping.	Yes.
Chalinolobus picatus	Little Pied Bat	NT	-	Bat detection devices (DSITIA, 2012; DEWHA, 2010a).	RPS Australia East (2014) (Attachment A) undertook surveys for this species using bat detection devices and harp trapping.	Yes.

[1] Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. NT=Near Threatened. SLC=Special Least Concern.

3.2.2 Ornamental Snake Predictive Mapping (Footprints Environmental Consultants, 2011a)

Footprints Environmental Consultants (Andrew Veary) was commissioned to provide predictive mapping for the Ornamental Snake in the BNCOP locality from the *Assessment of Seasonal Habitat Characteristics as Predictors of Habitat Suitability for the Threatened Ornamental Snake ACARP Project C15044* (Footprints Environmental Consultants, 2011a). The primary aims of the Australian Coal Association Research Program (ACARP) Project C15044 research program were to (Footprints Environmental Consultants, 2011a):

- *Collect quantitative data to support the hypothesis that brigalow-gilgai formations support a unique suite of characteristics and microhabitats required to support the Ornamental Snake as opposed to adjacent habitats within the distribution range of the species; and*
- *Utilise the improved understanding of this species' habitat and ecological requirements to improve conservation outcomes and long-term management practices within the Bowen Basin mining province and the known distribution range for the species.*

Andrew Veary contributed to the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a).

3.2.3 Baralaba North/Wonbindi North Mine - Fauna Surveys (Footprints Environmental Consultants, 2011b)

Footprints Environmental Consultants (2011b) undertook a fauna survey of ML80170 and ML80169 (Existing Operational Land) in March 2011 for CCL. Survey techniques included: bird surveys, diurnal herpetofauna ground searches, nocturnal ground searches, targeted area searches, bat surveys, driving spotlighting surveys and secondary evidence.

Footprints Environmental Consultants (2011b) recorded two conservation significant fauna species during the survey, namely the Squatter Pigeon (southern) (*Geophaps scripta scripta*) and Short-beaked Echidna (*Tachyglossus aculeatus*).

3.2.4 Baralaba North/Wonbindi North Mine - Flora Survey (QTree, 2011)

QTree (2011) undertook a flora survey of ML80170 and ML80169 (Existing Operational Land) in 2011 for CCL. The scope of works included vegetation mapping, compiling an inventory of native and introduced species and searches for threatened flora species. The survey was based on 62 observation points through the Baralaba North/Wonbindi North Mine pit and surrounding area.

No threatened flora species or endangered ecological communities were recorded by QTree (2011) within the Baralaba North/Wonbindi North Mine pit.

3.2.5 Recent Studies for Other Environmental Impact Statements

Minyango Central Project

Blackwater Coal Pty Ltd is proposing to develop the Minyango Central Coal Project located approximately 70 km north-west of the BNCOP, to the west of the Blackdown Tableland National Park and south of Blackwater, Qld.

Ecology Survey & Management (2013) undertook standard flora and fauna surveys over two seasons. The flora survey was undertaken between 1 and 3 November 2009 and 13 and 15 March 2010. The flora survey was undertaken between 1 and 6 November 2009 and 12 and 17 March 2010.

Three conservation significant fauna species were recorded during the surveys, namely the Squatter Pigeon (southern), Cotton Pygmy-goose (*Nettapus coromandelianus*) and Little Pied Bat (*Chalinolobus dwyeri*).

Ensham Central Project

Biodiversity Assessment and Management Pty Ltd (2006) undertook a baseline terrestrial fauna survey for the Ensham Central Project, an extension of the Ensham Coal Mine, located 30 km east of Emerald, Qld. The Ensham Coal Mine is located approximately 150 km north-west of the BNCOP.

Flora and fauna surveys were undertaken in October 2004 as well as February and March 2005. Three conservation significant fauna species were recorded during the surveys, namely the Cotton Pygmy-goose, Black-necked Stork (*Ephippiorhynchus asiaticus*) and Short-beaked Echidna.

Springsure Creek Coal Mine Project

Springsure Creek Coal Pty Ltd is proposing to develop the Springsure Creek Coal Mine Project located approximately 160 km west of the BNCOP (Springsure Creek Coal, 2013).

Flora and fauna surveys were undertaken between 6 to 12 December 2011, 18 to 23 June 2012 and 31 May to 5 June 2013 by Saunders Havill, Biodiversity Assessment and Management Pty Ltd, Terrestria and CDM Smith (Springsure Creek Coal, 2013).

Conservation significant fauna species during the surveys are the Black-necked Stork, Short-beaked Echidna and Koala (*Phascolarctos cinereus*) and Little Pied Bat (Springsure Creek Coal, 2013).

3.2.6 Threatened Species Information

A number of threatened species information sources were used in this assessment, including (but not limited to):

- *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a);
- Commonwealth *Species Profile and Threats Database* (DotE, 2014c);
- *Qld Recovery/Conservation Plans* (DEHP, 2014g); and
- distribution and habitat descriptions in seminal texts such as Morcombe (2004); Garnett *et. al.,* (2010) and Curtis *et. al.,* (2012).

3.2.7 Other Environmental Studies

This assessment has considered the following environmental assessments undertaken for the BNCOP:

- *Baralaba North Continued Operations Project Site Water Balance and Surface Water Assessment* (WRM Water and Environment, 2014).
- *Baralaba North Continued Operations Project Soil and Land Suitability Assessment* (Soil Mapping and Monitoring, 2014).
- *Baralaba North Continued Operations Project Noise and Vibration Assessment* (Simpson Engineering Group, 2014).
- *Baralaba North Continued Operations Project Air Quality and Greenhouse Gas Assessment* (Todoroski Air Sciences, 2014).

- *Baralaba North Continued Operations Project Aquatic Ecology Assessment* (frc environmental, 2014).
- *Baralaba North Continued Operations Project Groundwater Modelling and Assessment* (HydroSimulations, 2014).

4 DESCRIPTION OF THE FLORA AND VERTEBRATE FAUNA CHARACTERISTICS

4.1 OVERVIEW

4.2 VEGETATION COMMUNITIES

Past and ongoing agricultural activities (e.g. clearing, grazing, thinning, cropping) has resulted in large areas of open cleared land and a variety of modified and fragmented habitats. In the BNCOP Additional Footprint, the more mature regrowth vegetation (which meets the definition of 'Remnant'[5] under the *Vegetation Management Act 1999* (Qld) [VM Act]) occurs in patches, often retained along watercourses, in seasonally damp areas, as windbreaks between cultivated paddocks or as stock shelter. Some paddocks have been ploughed and others are used for improved pastures and grazing livestock. Cleared areas subject to lighter grazing contain scattered regrowth of trees and shrubs.

4.2.1 Regulated Vegetation Management Map

On 2 December 2013, a range of reforms to Qld's vegetation management laws took effect. One of the changes was the introduction of the Regulated Vegetation Management Map - a certified map showing vegetation category areas used to determine clearing requirements under the VM Act. The Regulated Vegetation Management Map and Supporting Map for the BNCOP locality are shown in Figures 8a and 8b.

Clearing vegetation within a ML is not subject to assessment and approval under the VM Act as clearing would be authorised under an Environmental Authority. All vegetation clearing proposed for the BNCOP is to occur within an ML, as such the BNCOP would not require an approval under the VM Act. Despite this, the ToR for the BNCOP require a description of actions that would be an assessable development for the purposes of the VM Act.

Most of the land in the BNCOP locality is cleared and mapped as Category X on the Regulated Vegetation Management Map. Category X areas are not regulated under the VM Act and clearing activities can occur without approval under the VM Act. Noting, that this includes some areas mapped as regional ecosystems by RPS Australia East (2014) (Attachment A).

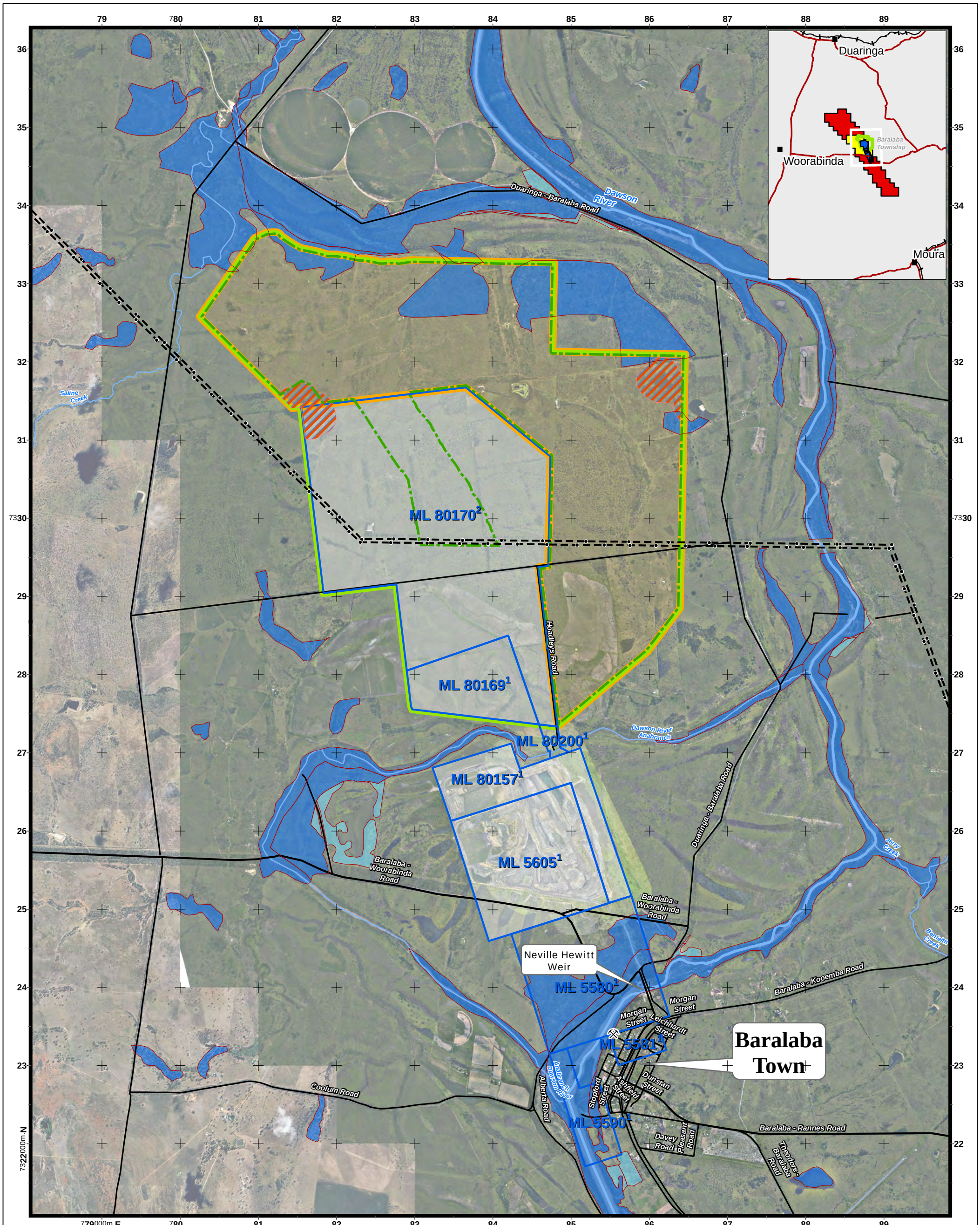
Areas shown on a Regulated Vegetation Management Map as Category A, B, C or R are subject to clearing requirements under the VM Act. There are no Category A or R areas on Figure 8a, but there are Category B and C areas. Remnant vegetation (Category B areas) are mostly along the Dawson River, the Dawson River Anabranch and the wetland to the north of the BNCOP Operational Land, associated with the relict drainage lines of the Dawson River (Figure 8a).

High value regrowth (or woody non-remnant vegetation) is defined as "all woody vegetation that fails to meet the structural and/or floristic characteristics of remnant vegetation. It may include regrowth, heavily thinned or logged and significantly disturbed vegetation" (Nelder *et al*., 2012). Small areas of high value regrowth vegetation (Category C areas) are also mapped (Figure 8a). High value regrowth vegetation is further discussed in Section 4.2.3.

[5] *Woody vegetation is mapped as remnant where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.*

…

Non-woody vegetation is vegetation in which the ecologically dominant stratum is composed of grasses and /or other non-woody vegetation (Nelder *et al.,* 2012).



PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

TITLE

Figure 8a
Regulated Vegetation Management Map

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Metres

REV	DESCRIPTION	DATE
0	Original map output	20/02/14
1		
2		

SCALE **1:45,000**
SIZE A3
DATUM GDA 94
PROJECTION MGA Zone 55

CURRENT ISSUE SIGNATURES

DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

DATA SOURCES:
VECTOR DATA:
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DNRM, 2014

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NOTE:
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² : HELD BY WONBINDI COAL PTY LTD

Legend

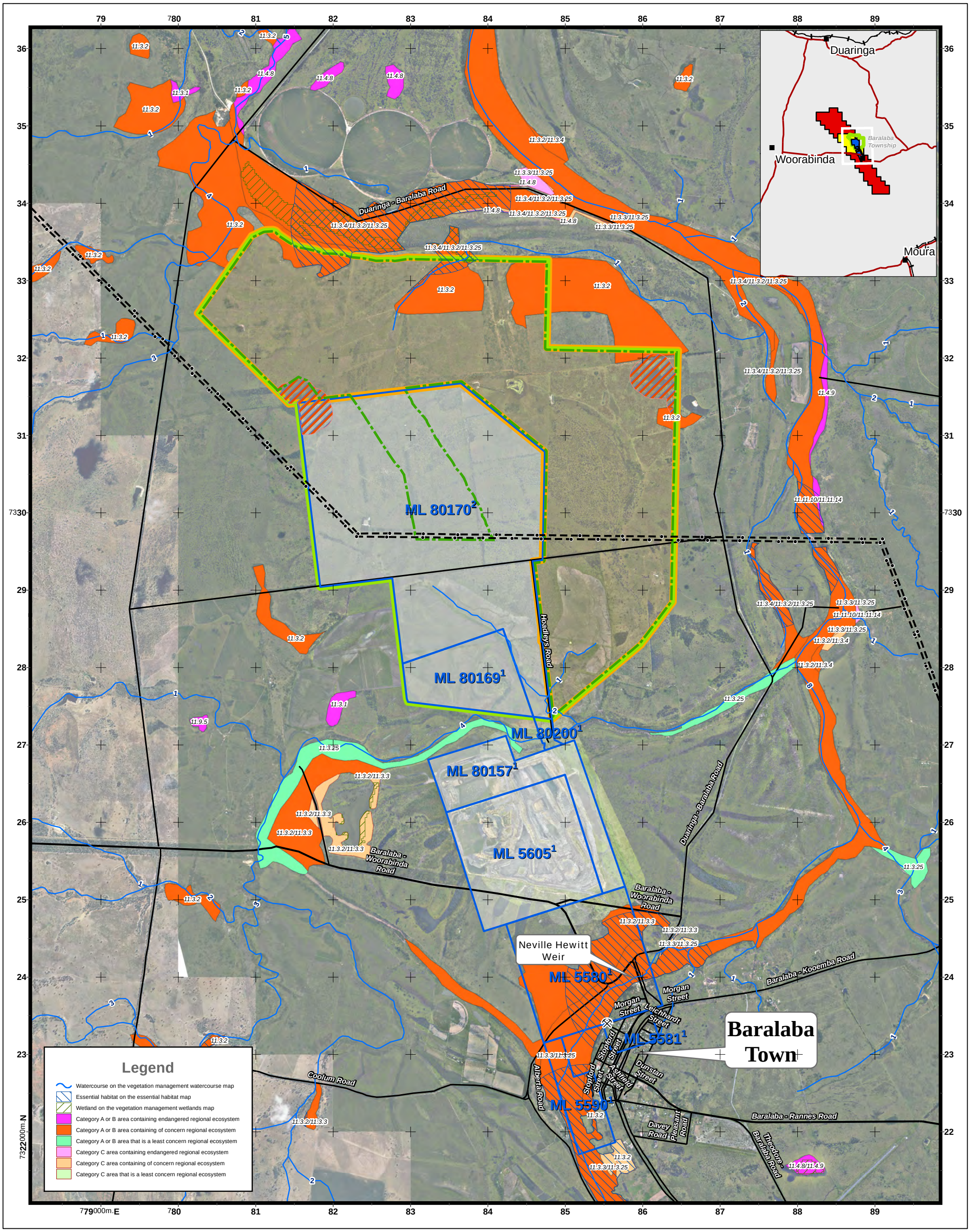
Road.....
Watercourse.....
Powerline & Power Pole.
Cockatoo Coal ML.....
Area of Exclusion of Mining Activities.
Existing Operational Land.....
BNCOP Operational Land.....
BNCOP Action Area.....
BNCOP Additional Footprint...
Category B Area (Remnant vegetation).....
Category C Area (High-value regrowth vegetation)..
Category X Area (Cleared Land - all other areas)....

Cockatoo Coal Limited

STATUS **FINAL**

PROJECT NO Baralaba Nth
DRAWING NO BBN-098-140313-14-01

Path: N:\Baralaba\Baralaba_North\PROJECTS\1403\BBN_098_140121_EIS_AppA_Terrestrial_Ecology\BBN_098_14_01_140313_EIS_Regulated_Veg_Manage_A3P.mxd



PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

TITLE

Figure 8b
Vegetation Management Supporting Map

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REV	DESCRIPTION	DATE
0	Original map output	20/02/14
1		
2		

SCALE **1:45,000**
SIZE A3
DATUM GDA 94
PROJECTION MGA Zone 55

CURRENT ISSUE SIGNATURES

DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

DATA SOURCES:

VECTOR DATA:
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Legend

Road.....
Watercourse.....
Powerline & Power Pole.
Cockatoo Coal ML.....
Existing Operational Land.....
BNCOP Operational Land.....
BNCOP Action Area.....
BNCOP Additional Footprint...
Area of Exclusion of Mining Activities.

Cockatoo Coal Limited

STATUS **FINAL**

PROJECT NO Baralaba Nth

DRAWING NO BBN-098-15-01-140314

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4.2.2 Regional Ecosystems

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Each regional ecosystem is given a three part code with the first number referring to the biogeographic region, second number refers to the land zone (a simplified geology/substrate-landform classification for Qld) and the third number denotes the vegetation type. Regional ecosystems have been mapped across Qld by DEHP (2014f).

RPS Australia East (2014) (Attachment A) ground-truthed the regional ecosystems in the BNCOP locality to confirm the DEHP (2014f) regional ecosystem mapping and rectify inaccuracies. The inaccuracies are described in Attachment A. Ground-truthed regional ecosystems are listed in Table 5 and shown on Figure 9. A Property Map of Assessable Vegetation application under the VM Act has been lodged separately.

Table 5
Ground-truthed Regional Ecosystems

	#	Vegetation Community	Condition State*	Conservation Status		
				VM Act	Biodiversity Status	EPBC Act
Brigalow Woodland	1a	RE11.3.1: Brigalow (*Acacia harpophylla*) ± Poplar Box (*Eucalyptus populnea*) Open Forest to Woodland[1]	Remnant	Endangered	Endangered	Endangered[1]
	1b	RE11.3.1: Brigalow (*A. harpophylla*) Disturbed Low Open Forest	Disturbed HVR	Endangered	Endangered	-
	1c	RE11.3.1: Brigalow (*A. harpophylla*) Low Open Forest	HVR	Endangered	Endangered	Some patches represent the Endangered community[1]
Brigalow Palustrine Wetland	2	RE11.4.8: Blackbutt (*E. cambageana*) and Brigalow (*A. harpophylla*) Open Forest to Woodland[1]	Remnant	Endangered	Endangered	Endangered[1]
	3a	RE11.4.8a: Brigalow (*A. harpophylla*) Palustrine Wetland[1]	Remnant	Endangered	Endangered	Endangered[1]
	3b	RE11.4.8a Brigalow (*A. harpophylla*) Disturbed Palustrine Wetland[1]	HVR	Endangered	Endangered	Some patches represent the Endangered community[1]
Riparian Woodland	4a	RE11.3.3: Coolibah (*E. coolabah*) Open Forest to Woodland[2]	Remnant	Of Concern	Of Concern	Endangered[2]
	4b	RE11.3.3: Coolibah (*E. coolabah*) Disturbed Open Forest to Woodland	Disturbed Remnant	Of Concern	Of Concern	-
	4c	RE11.3.3: Coolibah (*E. coolabah*) Low Open Forest to Woodland	HVR	Of Concern	Of Concern	-
	5	RE11.3.4: Queensland Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*Corymbia tesselaris*) Open Forest	Remnant	Of Concern	Of Concern	-
Eucalypt Open Forest	6a	RE11.5.5: Poplar Box (*E. populnea*) ± Silver-leaved Ironbark (*E. melanophloia*) ± Blackbutt (*E. cambageana*) ± Moreton Bay Ash (*C. tesselaris*) Open Forest	Remnant	Least Concern	No Concern at Present	-
	6b	RE11.5.5: White Cypress (*Callitris glaucophylla*) Low Open Forest	Remnant	Least Concern	No Concern at Present	-
	7	RE11.3.2: Poplar Box (*E. populnea*) ± Silver-leaved Ironbark (*E. melanophloia*) Open Forest	Remnant	Of Concern	Of Concern	-
	8a	RE11.5.9: Silver-leaved Ironbark (*E. melanophloia*) ± Narrow-leaved Ironbark (*E. crebra*) ± Bloodwood (*C. intermedia*) ± Dallachy's Gum (*C. dallachiana*) Open Forest	Remnant	Least Concern	No Concern at Present	-
	8b	RE11.5.9: Silver-leaved Ironbark (*E. melanophloia*) ± Narrow-leaved Ironbark (*E. crebra*) ± Bloodwood (*C.intermedia*) ± Dallachy's Gum (*C. dallachiana*) Low Open Forest	HVR	Least Concern	No Concern at Present	-

Vegetation number	Vegetation Community
Brigalow Woodland	
1a	RE11.3.1: *Acacia harpophylla +/- Eucalyptus populnea* Open Forest to Woodland
1b	RE11.3.1: *A. harpophylla* Disturbed Low Open Forest
1c	RE11.3.1: *A. harpophylla* Low Open Forest
Brigalow Palustrine Wetland	
2	RE11.4.8: *E.cambageana* and *A.harpophylla* Open Forest to Woodland
3a	RE11.4.8a: *A. harpophylla* Palustrine Wetland
3b	RE11.4.8a: *A. harpophylla* Disturbed Palustrine Wetland
Riparian	
4a	RE11.3.3: *E. coolibah* Open Forest to Woodland
4b	RE11.3.3: *E. coolibah* Disturbed Open Forest to Woodland
4c	RE11.3.3: *E. coolibah* Low Open Forest to Woodland
5	RE11.3.4: *E. tereticornis* and *Corymbia tesselaris* Open Forest
Eucalypt Open Forest	
6a	RE11.5.5: *E. populnea +/- E. melanophloia +/- E. cambageana +/- C. tesselaris* Open Forest
6b	RE11.5.5: *Callitris glaucophylla* Low Open Forest
7	RE11.3.2: *E. populnea +/- E. melanophloia* Open Forest
8a	RE11.5.9: *E. melanophloia +/- E. crebra +/- C.intermedia +/- C. dallachiana* Open Forest
8b	RE11.5.9: *E. melanophloia +/- E. crebra +/- C. intermedia +/- C. dallachiana* Low Open Forest
Ephemeral Wetland	
9	RE11.3.27i: *E. tereticornis* Palustrine Wetland

PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

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0 500 1,000 1,500 2,000
Metres

DATA SOURCES:
VECTOR DATA:
© DERM - LAND & PROPERTY DATA
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RPS, 2014

NOTE:
[1]: HELD BY BARALABA COAL PTY LTD
[2]: HELD BY WONBINDI COAL PTY LTD

PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.

Legend

Road.....
Watercourse.....
Powerline & Power Pole.
Cockatoo Coal ML.....
Existing Operational Land.....
BNCOP Operational Land.....
BNCOP Action Area.....
BNCOP Additional Footprint...
Area of Exclusion of Mining Activities.

TITLE

Figure 9
Ground-truthed
Vegetation Communities

REV	DESCRIPTION	DATE
0	Original map output	12/02/14
1	Data Updates	13/02/14
2	Data Updates	25/02/14

SCALE **1:45,000**
SIZE A3
DATUM GDA 94
PROJECTION MGA Zone 55

CURRENT ISSUE SIGNATURES

DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

Cockatoo Coal Limited

STATUS **FINAL**

PROJECT NO Baralaba Nth
DRAWING NO BBN-098-09-03-140314

Path: N:\Baralaba\Baralaba_North\PROJECTS\1403\BBN_098_140121_EIS_AppA_Terrestrial_Ecology\BBN_098_09_03_140314_EIS_Vegetation_Communities_A3P.mxd

Table 5 (Continued)
Ground-truthed Regional Ecosystems

	#	Vegetation Community	Condition State*	Conservation Status		
				VM Act	Biodiversity Status	EPBC Act
Ephemeral Wetland	9	RE11.3.27i: Queensland Blue Gum (*E. tereticornis*) Palustrine Wetland	Remnant	Least Concern	Of Concern	-

Source: Attachment A.

* Condition State:
Remnant = Refer to definition in Section 4.2.
Disturbed Remnant = A more disturbed version of remnant vegetation.
HVR = High Value Regrowth (Refer to definition in Section 4.2.1).
Disturbed HVR = A more disturbed version of High Value Regrowth vegetation.

[1] Patches of Brigalow TEC are shown on Figure 10.

[2] Patches of Coolibah-Black Box Woodland TEC are shown on Figure 10.

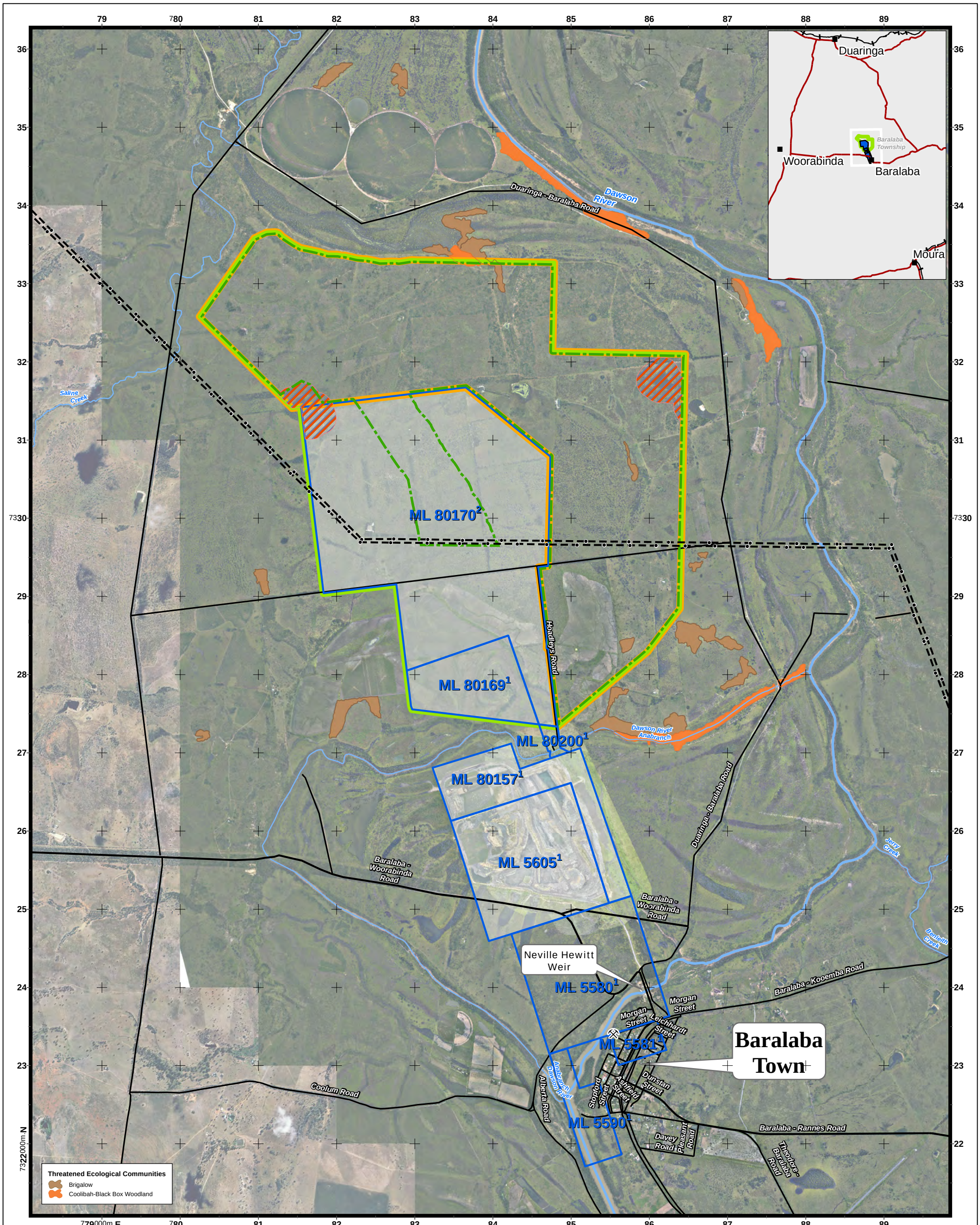
Note: Highlighted cells are vegetation communities within the BNCOP Additional Footprint.

A total of 16 individual vegetation communities are listed in Table 5 (Vegetation Communities 1a to 9). These make up nine regional ecosystems (in various condition states) represented by Brigalow Woodlands, Brigalow Palustrine Wetlands, Riparian Woodland, Eucalypt Open Forest and Ephemeral Wetlands (Table 5).

The ground-truthed vegetation in the BNCOP locality includes patches of *Brigalow (Acacia harpophylla Dominant and Co-dominant) Threatened Ecological Community* (Brigalow TEC) and *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions Threatened Ecological Community* (Coolibah-Black Box Woodland TEC) listed under the EPBC Act as annotated in Table 5 and described in Section 4.2.5.

None of the regional ecosystems are remnant 'Endangered' grassland regional ecosystems, remnant 'Of Concern' grassland regional ecosystems, threshold regional ecosystems or critically limited regional ecosystems as defined in the *Queensland Biodiversity Offset Policy (Version 1) 3 October 2011* (DNRM, 2011).

Table 6 contains a brief description of the occurrence of each vegetation community in the BNCOP locality. Plates 1 to 11 show photos of the vegetation communities within the BNCOP Operational Land. Further descriptions are provided in Attachment A.



PROJECT: **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.	N; 0 500 1,000 1,500 2,000 Metres	DATA SOURCES: VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA RPS, 2014	*NOTE:* ¹: HELD BY BARALABA COAL PTY LTD ²: HELD BY WONBINDI COAL PTY LTD		
TITLE: **Figure 10 Threatened Ecological Communities**	REV / DESCRIPTION / DATE: 0 Original map output 12/02/14; 1 Data Updates 13/02/14; 2	SCALE **1:45,000**; SIZE A3; DATUM GDA 94; PROJECTION MGA Zone 55	CURRENT ISSUE SIGNATURES: DRAWN MJS; CHECKED BJD; APPROVED BJD	*PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	Legend: Road, Watercourse, Powerline & Power Pole, Cockatoo Coal ML, Existing Operational Land, BNCOP Operational Land, BNCOP Action Area, BNCOP Additional Footprint, Area of Exclusion of Mining Activities.	Cockatoo Coal Limited; STATUS **FINAL**; PROJECT NO Baralaba Nth; DRAWING NO BBN-098-10-02-140314

Path: N:\Baralaba\Baralaba_North\PROJECTS\1403\BBN_098_140121_EIS_AppA_Terrestrial_Ecology\BBN_098_10_02_140314_EIS_Ecological_Communities_A3P.mxd

Table 6
Description of Regional Ecosystems in the BNCOP Locality

	#	Vegetation Community	Short Description
Brigalow Woodland	1a	RE11.3.1: Brigalow (*Acacia harpophylla*) ± Poplar Box (*Eucalyptus populnea*) Open Forest to Woodland[1]	This vegetation community is dominated by an overstorey of Brigalow (*Acacia harpophylla*) with occasional Eucalypt species. Two patches of this vegetation community are mapped on Figure 9, one to the south-west of the approved Baralaba North/Wonbindi North Mine and a smaller patch within the BNCOP Additional Footprint (Plate 1). These patches are of remnant status but are moderately disturbed (between 30 to 90% weed cover in the understorey) (Attachment A). The two patches meet the criteria for the Brigalow Woodland TEC.
	1b	RE11.3.1: Brigalow (*A. harpophylla*) Disturbed Low Open Forest	This vegetation community occurs in two patches in the south of the BNCOP locality, one within the BNCOP Additional Footprint, the other only partially within (Figure 9; Plate 2). Vegetation Community 1b is a regrowth version of Vegetation Community 1a and is more degraded as it lacks a mid-storey or shrub layer and has high weed cover (average 95%). Vegetation Community 1b in the BNCOP Additional Footprint does not meet the criteria for the Brigalow Woodland TEC.
	1c	RE11.3.1: Brigalow (*A. harpophylla*) Low Open Forest	This vegetation community occurs in four patches in the south of the BNCOP locality (mostly south of the BNCOP Additional Footprint) (Figure 9). Similar to Vegetation Community 1b, Vegetation Community 1c is also regrowth and degraded (weed cover is around 70%). A linear strip of Vegetation Community 1c (a wind break between paddocks) occurs in the south of the Additional Footprint (Plate 3). This linear patch does not meet the criteria for the Brigalow Woodland TEC.
Brigalow Palustrine Wetland	2	RE11.4.8: Blackbutt (*E. cambageana*) and Brigalow (*A. harpophylla*) Open Forest to Woodland	This vegetation community has an open forest to woodland structure but contains gilgai depressions that are seasonally inundated. This vegetation community is dominated by an overstorey of Brigalow (*Acacia harpophylla*) with occasional Eucalypt species. One small patch of this vegetation community was mapped to the far south-west of the BNCOP Additional Footprint and four small patches were mapped to the east of the BNCOP Additional Footprint (Figure 9). These patches are of remnant status but are degraded with high weed cover (average 65%).
	3a	RE11.4.8a: Brigalow (*A. harpophylla*) Palustrine Wetland[1]	Of the four patches of Vegetation Community 3a mapped, one occurs in the BNCOP Additional Footprint (Figure 9; Plate 4). These patches are of remnant status but are degraded (weed cover is around 50%). All four patches of Vegetation Community 3a meet the criteria for the Brigalow Woodland TEC.
	3b	RE11.4.8a Brigalow (*A. harpophylla*) Disturbed Palustrine Wetland[1]	Vegetation Community 3b is a regrowth version of Vegetation Community 3a and is more degraded (with high weed cover and poor structural complexity) (Plate 5). One patch of Vegetation Community 3b in the north of the BNCOP Additional Footprint meets the criteria for the Brigalow Woodland TEC (Figure 9).
Riparian Woodland	4a	RE11.3.3: Coolibah (*E. coolabah*) Open Forest to Woodland[2]	This vegetation community is dominated by an overstorey of Coolabah (*Eucalyptus coolibah*). This vegetation community occurs on the floodplains in a reach along the Dawson River and Dawson River Anabranch. There is also a small patch to the south of the wetland to the north of the BNCOP Operational Land (Figure 9; Plate 6). Vegetation Community 4a is in relatively good condition and meets the criteria for the Coolibah-Black Box Woodland TEC.
	4b	RE11.3.3: Coolibah (*E. coolabah*) Disturbed Open Forest to Woodland	Disturbed areas of remnant Vegetation Community 4a have been mapped as Vegetation Community 4b outside of the BNCOP Additional Footprint (Figure 9). Weed cover is high (> 60% cover).
	4c	RE11.3.3: Coolibah (*E. coolabah*) Low Open Forest to Woodland	Vegetation Community 4c is a regrowth version of Vegetation Community 4a and is more degraded. This community is located in two small patches to the south-west of the BNCOP Operational Land (Figure 9). This version of the community lacks structural complexity due to past clearing.

Table 6 (Continued)
Description of Regional Ecosystems in the BNCOP Locality

	#	Vegetation Community	Short Description
Riparian Woodland (Continued)	5	RE11.3.4: Queensland Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*Corymbia tesselaris*) Open Forest	This vegetation community is dominated by an overstorey of Queensland Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*Corymbia tesselaris*) with occasional Coolabah (*Eucalyptus coolibah*). The groundcover is dominated by exotic grasses such as Buffel Grass (*Cenchrus ciliaris*). This vegetation community occurs as riparian vegetation along the Dawson River, Saline Creek and associated with the wetland to the north of the BNCOP Operational Land (Figure 9; Plate 7). This community also occurs in small patches unrelated to the riparian vegetation along waterways and is dominated by Queensland Blue Gum (*E. tereticornis*) in those locations (Figure 9).
Eucalypt Open Forest	6a	RE11.5.5: Poplar Box (*E. populnea*) ± Silver-leaved Ironbark (*E. melanophloia*) ± Blackbutt (*E. cambageana*) ± Moreton Bay Ash (*C. tesselaris*) Open Forest	This vegetation community is dominated by Poplar Box (*E. populnea*). A small patch occurs in the BNCOP Additional Footprint and larger patches occur to the west and north (Figure 9; Plate 8). Vegetation Community 6a is in relatively good condition (due to its structural complexity) although weed cover is high (average 85% cover).
	6b	RE11.5.5: White Cypress (*Callitris glaucophylla*) Low Open Forest	Disturbed areas of remnant Vegetation Community 6a dominated by White Cypress (*Callitris glaucophylla*) have been mapped as Vegetation Community 6b outside of the BNCOP Additional Footprint (Figure 9). A single patch of this vegetation community was mapped in the far north-west (Figure 9).
	7	RE11.3.2: Poplar Box (*E. populnea*) ± Silver-leaved Ironbark (*E. melanophloia*) Open Forest	This vegetation community is dominated by Poplar Box (*E. populnea*) and Silver-leaved Ironbark (*E. melanophloia*). This vegetation community occurs in the north-east of the BNCOP locality (Figure 9; Plate 9). Vegetation Community 7 is in relatively good condition (due to its structural complexity) although weed cover is high (average 70% cover).
	8a	RE11.5.9: Silver-leaved Ironbark (*E. melanophloia*) ± Narrow-leaved Ironbark (*E. crebra*) ± Bloodwood (*C.intermedia*) ± Dallachy's Gum (*C. dallachiana*) Open Forest	This vegetation community is dominated by Silver-leaved Ironbark (*E. melanophloia*). This is one of the most abundant vegetation communities in the BNCOP locality (Figure 9; Plate 10). The condition of this vegetation community is poor and weed cover is high (average 88% cover).
	8b	RE11.5.9: Silver-leaved Ironbark (*E. melanophloia*) ± Narrow-leaved Ironbark (*E. crebra*) ± Bloodwood (*C.intermedia*) ± Dallachy's Gum (*C. dallachiana*) Low Open Forest	Disturbed areas of remnant Vegetation Community 8a have been mapped as Vegetation Community 8b and are in poorer condition due to a lack of structural complexity. This vegetation community occurs in various patches (Figure 9; Plate 11).
Ephemeral Wetland	9	RE11.3.27i: Queensland Blue Gum (*E. tereticornis*) Palustrine Wetland	This vegetation community is dominated by Queensland Blue Gum (*E. tereticornis*). This vegetation community occurs in a palustrine wetland (named the North-west Soak) inside the BNCOP Operational Land (and Existing Operational Land) (Figure 9; Section 4.4.2). A buffer has been established around the North-west Soak.

Source: Attachment A.

HVR = High Value Regrowth.

Note: highlighted cells are vegetation communities within the BNCOP Additional Footprint.

[1] Patches of Brigalow TEC are shown on Figure 10.

[2] Patches of Coolibah-Black Box Woodland TEC are shown on Figure 10.

Plate 1 **Vegetation Community 1a RE11.3.1: *Acacia harpophylla* ± *Eucalyptus populnea* Open Forest to Woodland = Brigalow Woodland Habitat Type = Brigalow TEC.**

Plate 2 **Vegetation Community 1b RE11.3.1: *A. harpophylla* Disturbed Low Open Forest = Disturbed Brigalow Woodland Habitat Type.**

Plate 3 Vegetation Community 1c RE11.3.1: *A. harpophylla* Low Open Forest = Disturbed Brigalow Woodland Habitat Type.

Plate 4 Vegetation Community 3a RE11.4.8a: *A. harpophylla* Palustrine Wetland = Brigalow Palustrine Wetland Habitat Type = Brigalow TEC.

Plate 5 Vegetation Community 3b RE11.4.8a*: A. harpophylla* Disturbed Palustrine Wetland = Disturbed Brigalow Palustrine Wetland Habitat Type.

Plate 6 Vegetation Community 4a RE11.3.3: *E. coolibah* Open Forest to Woodland = Riparian Woodland Habitat Type = Coolibah-Black Box Woodland TEC.

Plate 7 **Vegetation Community 5 RE11.3.4: *E. tereticornis* and *Corymbia tesselaris* Open Forest = Riparian Woodland Habitat Type.**

Plate 8 **Vegetation Community 6a RE11.5.5: *E. populnea* ± *E. melanophloia* ± *E. cambageana* ± *C. tesselaris* Open Forest = Eucalypt Open Forest Habitat Type.**

Plate 9 **Vegetation Community 7 RE11.3.2: *E. populnea* ± *E. melanophloia* Open Forest = Eucalypt Open Forest Habitat Type.**

Plate 10 **Vegetation Community 8a RE11.5.9: *E. melanophloia* ± *E. crebra* ± *C.intermedia* ± *C. dallachiana* Open Forest = Eucalypt Open Forest Habitat Type.**

Plate 11 Vegetation Community 8b RE11.5.9: E*. melanophloia* ± *E. crebra* ± *C. intermedia* ± *C. dallachiana* Low Open Forest = Disturbed Eucalypt Low Open Forest Habitat Type.

4.2.3 High Value Regrowth

High value regrowth vegetation recorded in the BNCOP Additional Footprint and surrounding land are those listed in Table 7. The information in Table 7 has been extracted from Table 6. Note that due to recent reforms, high value regrowth does not have a 'Biodiversity Status' unless it is on leasehold land for agriculture or grazing. The BNCOP is on freehold land but there is some leasehold land in the surrounding areas mapped by RPS Australia East (2014).

Table 7
High Value Regrowth in the BNCOP Locality

	#	Vegetation Community	Condition State*	VM Act	Biodiversity Status
Brigalow Woodland	1b	RE11.3.1: Brigalow (*A. harpophylla*) Disturbed Low Open Forest	Disturbed HVR	Endangered	Endangered
	1c	RE11.3.1: Brigalow (*A. harpophylla*) Low Open Forest	HVR	Endangered	Endangered
Brigalow Palustrine Wetland	3b	RE11.4.8a Brigalow (*A. harpophylla*) Disturbed Palustrine Wetland[1]	HVR	Endangered	Endangered
Riparian Woodland	4c	RE11.3.3: Coolibah (*E. coolabah*) Low Open Forest to Woodland	HVR	Of Concern	Of Concern

Table 7 (Continued)
High Value Regrowth in the BNCOP Locality

	#	Vegetation Community	Condition State*	VM Act	Biodiversity Status
Eucalypt Open Forest	8b	RE11.5.9: Silver-leaved Ironbark (*E. melanophloia*) ± Narrow-leaved Ironbark (*E. crebra*) ± Bloodwood (*C.intermedia*) ± Dallachy's Gum (*C. dallachiana*) Low Open Forest	HVR	Least Concern	No Concern at Present

Source: Attachment A.

* Condition State:

HVR = High Value Regrowth (Refer to definition in Section 4.2.1).

Disturbed HVR = A more disturbed version of High Value Regrowth vegetation.

[1] Patches of Brigalow TEC are shown on Figure 10.

Note: Highlighted cells are vegetation communities within the BNCOP Additional Footprint.

4.2.4 Groundwater Dependent Vegetation

Groundwater Dependent Ecosystems are defined as (Richardson *et al.,* 2011):

> *Natural* ecosystems *that require access to groundwater to meet all or some of their water requirements on a permanent or intermittent basis, so as to maintain their communities of plants and animals,* ecosystem *processes and* ecosystem *services.*

The *National Atlas of Groundwater Dependent Ecosystems* (BoM, 2014) indicates that there are surface areas with possible high, moderate and low potential for groundwater interaction within the BNCOP locality. Groundwater sampling and modelling (HydroSimulations, 2014) confirms that groundwater is generally greater than 5 m below surface within the BNCOP Additional Footprint and surrounds. The regional water table is shallow (less than 5 m) only in relatively small portions of the water table, mostly along watercourses such as the Dawson River, Dawson River Anabranch and the unnamed first order stream.

The riparian woodland vegetation along the floodplain and banks of the Dawson River and Dawson River Anabranch (RE11.3.3 and RE11.3.4) is likely to be dependent on high water availability in the alluvium soils along the rivers. Groundwater baseflow to the Dawson River and Dawson River Anabranch may sustain the riparian vegetation in addition to surface water inflows, however the groundwater assessment (HydroSimulations, 2014) indicates that the baseflow contribution to these watercourses is small.

The vegetation along the unnamed first order stream (i.e. mostly Eucalypt Open Forest) is the same as the vegetation that occurs away from the stream and therefore it is considered unlikely that the Eucalypt Open Forest is dependent on groundwater. The trees within the Eucalypt Open Forest (e.g. Poplar Box [*E. populnea*], Silver-leaved Ironbark [*E. melanophloia*], Narrow-leaved Ironbark [*E. crebra*] and Blackbutt [*E. cambageana*]) are not known to be dependent on groundwater and grow on areas without a shallow groundwater table.

Frc environmental (2014) did not identify any springs in the BNCOP locality (i.e. the palustrine wetlands are not groundwater fed wetlands).

4.2.5 Conservation Significant Vegetation Communities

Conservation significant vegetation communities are described in this report as regional ecosystems that are listed as 'Endangered' and 'Of Concern' under the VM Act and ecological communities listed as 'Vulnerable', 'Endangered' or 'Critically Endangered' under the EPBC Act.

Conservation significant vegetation communities recorded in the BNCOP Additional Footprint and surrounding land are listed in Table 8 (note, the information in Table 8 has been extracted from Table 6).

The 'Biodiversity Status' is not listed under the VM Act but is used for a range of planning and management applications including the Biodiversity Planning Assessments and to determine environmentally sensitive areas (DEHP, 2014d) (Table 8). Regional ecosystems with a biodiversity status of 'Endangered' are recognised as Category B Environmentally Sensitive Areas. In the BNCOP Additional Footprint, this includes 'Remnant' states of RE11.3.1 (Vegetation Community 1a) and RE11.4.8a (Vegetation Community 3a). However, it is noted that the Environmentally Sensitive Areas mapping for the location shows no Category B Environmentally Sensitive Areas in the BNCOP Additional Footprint (DEHP, 2014d) (Section 4.6).

Table 8
Conservation Significant Vegetation Communities

	#	Vegetation Community	Condition State*	VM Act	Biodiversity Status	EPBC Act
Brigalow Woodland	1a	RE11.3.1: Brigalow (*Acacia harpophylla*) ± Poplar Box (*Eucalyptus populnea*) Open Forest to Woodland[1]	Remnant	Endangered	Endangered	Endangered[1]
	1b	RE11.3.1: Brigalow (*A. harpophylla*) Disturbed Low Open Forest	Disturbed HVR	Endangered	Endangered	-
	1c	RE11.3.1: Brigalow (*A. harpophylla*) Low Open Forest	HVR	Endangered	Endangered	Some patches represent the Endangered community[1]
Brigalow Palustrine Wetland	2	RE11.4.8: Blackbutt (*E. cambageana*) and Brigalow (*A. harpophylla*) Open Forest to Woodland[1]	Remnant	Endangered	Endangered	Endangered[1]
	3a	RE11.4.8a: Brigalow (*A. harpophylla*) Palustrine Wetland[1]	Remnant	Endangered	Endangered	Endangered[1]
	3b	RE11.4.8a Brigalow (*A. harpophylla*) Disturbed Palustrine Wetland[1]	HVR	Endangered	Endangered	Some patches represent the Endangered community[1]
Riparian Woodland	4a	RE11.3.3: Coolibah (*E. coolabah*) Open Forest to Woodland[2]	Remnant	Of Concern	Of Concern	Endangered[2]
	4b	RE11.3.3: Coolibah (*E. coolabah*) Disturbed Open Forest to Woodland	Disturbed Remnant	Of Concern	Of Concern	-
	4c	RE11.3.3: Coolibah (*E. coolabah*) Low Open Forest to Woodland	HVR	Of Concern	Of Concern	-
	5	RE11.3.4: Queensland Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*Corymbia tesselaris*) Open Forest	Remnant	Of Concern	Of Concern	-

Table 8 (Continued)
Conservation Significant Vegetation Communities

	#	Vegetation Community	Condition State*	VM Act	Biodiversity Status	EPBC Act
Eucalypt Open Forest	7	RE11.3.2: Poplar Box (*E. populnea*) ± Silver-leaved Ironbark (*E. melanophloia*) Open Forest	Remnant	Of Concern	Of Concern	-

Source: Attachment A.

* Condition State:

Remnant = Refer to definition in Section 4.2.

Disturbed Remnant = A more disturbed version of remnant vegetation.

HVR = High Value Regrowth (Refer to definition in Section 4.2.1).

Disturbed HVR = A more disturbed version of High Value Regrowth vegetation.

Note: Highlighted cells are significant vegetation communities within the BNCOP Additional Footprint.

[1] Patches of Brigalow TEC are shown on Figure 10.

[2] Patches of Coolibah-Black Box Woodland TEC are shown on Figure 10.

Conservation Significant Vegetation under the Vegetation Management Act

The Brigalow Woodland and Brigalow Palustrine Wetland in the BNCOP locality (RE11.3.1, RE11.4.8 and RE11.4.8a) are listed as 'Endangered' under the VM Act (Table 8). Regional ecosystems listed as 'Endangered' are "less than 10 per cent of its pre-clearing extent across the bioregion; or 10–30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares".

The Riparian Woodland and Eucalypt Open Forest in the BNCOP locality (RE11.3.3; RE11.3.4 and RE11.3.2) are listed as 'Of Concern' under the VM Act (Table 8). Regional ecosystems listed as 'Of Concern' are "10–30 per cent of its pre-clearing extent across the bioregion; or more than 30 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares".

Threatened Ecological Communities listed under the EPBC Act

The Brigalow TEC and Coolibah-Black Box Woodland TEC listed under the EPBC Act have been recorded in the BNCOP Additional Footprint/Action Area and wider locality (Table 8; Figure 10). Identification of these threatened ecological communities was based on relevant guidelines/advice including (Attachment A):

- *Brigalow (Acacia harpophylla dominant and co-dominant) Species Profile and Threats Database* (DotE, 2014c).
- *Brigalow (Acacia harpophylla dominant and co-dominant) Information Sheet* (SEWPaC, 2003).
- *Approved Conservation Advice for Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions Ecological Community* (SEWPaC, 2011b).

The Brigalow TEC is represented by patches of Vegetation Communities 1a, 2 and 3a (Plates 1 and 4) as well as some patches of Vegetation Communities 1c and 3b (Figures 9 and 10). The patches of Brigalow TEC are small, degraded by edge effects, weeds and are highly fragmented. The Brigalow TEC is further discussed in Section 5.6.2.

The Coolibah-Black Box Woodland TEC (Vegetation Community 4a – RE11.3.3) was recorded on floodplains of the Dawson River, Dawson River Anabranch and adjacent to the wetland to the north of the BNCOP Operational Land (Figure 10; Plate 6). The Coolibah-Black Box Woodland TEC is further described in Attachment A.

4.2.6 Connectivity

The BNCOP is located in an extensively cleared agricultural landscape and the woodland/forest is highly fragmented. As previously mentioned, the more mature regrowth vegetation in the BNCOP Additional Footprint occurs in patches, often retained along watercourses, in seasonally damp areas, as windbreaks between cultivated paddocks or as stock shelter. These patches may provide some stepping stone connectivity for mobile species (Attachment A).

The vegetation in the north of the BNCOP Additional Footprint is relatively better connected and is recognised as part of a bioregional corridor which takes in most patches of remnant vegetation in the locality including along the Dawson River to the east and Dawson Range State Forest to the west (DEHP, 2009) (Figure 6).

4.3 FLORA

4.3.1 Flora Diversity and Composition

A complete list of native and introduced flora species recorded by RPS Australia East (2014) in the BNCOP locality is provided in Attachment A. A total of 109 native flora species and 37 introduced flora species were recorded across the BNCOP Additional Footprint and also in the surrounding habitats. The most recorded family of native species was Poaceae (22 species) and Myrtaceae (11 species).

4.3.2 Conservation Significant Flora Species

Conservation significant flora species is a term used to describe threatened flora species ('Extinct in the wild', Critically Endangered', 'Endangered' and 'Vulnerable') listed under the NC Act or EPBC Act, 'Near Threatened' flora species listed under the NC Act and 'Special Least Concern' flora species listed under the NC Act.

Attachment C provides a review of the conservation significant flora species relevant to the BNCOP (produced from the database searches in Attachment B). No conservation significant flora species have been recorded in the BNCOP Additional Footprint or surrounds, despite targeted surveys (Attachment A).

4.3.3 Exotic Flora and Declared Plants

Weed species occur extensively across the BNCOP Additional Footprint, likely due to the high level of past clearance and the current land use (e.g. grazing) (Attachment A). Pasture weed species such as Guinea Grass (*Megathyrsus maximus*), Buffel Grass (*Cenchrus ciliaris*), Sabi Grass (*Urochloa mosambicensis*) and Noogoora Burr (*Xanthium pungens*) are common (Attachment A).

Declared plants are listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (Qld) (LP Act) and are targeted for control because they have, or could have, serious economic, environmental or social impacts. Landowners have a legal responsibility for the control of declared plants. A low abundance of four weeds declared under the LP Act were recorded by RPS Australia East (2014) (Attachment A) during the survey of the BNCOP locality, namely the Velvety Tree Pear (*Opuntia tomentosa*), Fireweed (*Senecio madagascariensis*), Mother of Millions (*Bryophyllum* spp.) and Lantana (*Lantana camara*).

4.4 VERTEBRATE FAUNA

4.4.1 Broad Fauna Habitat Types

Past and ongoing agricultural activities (e.g. clearing, grazing, thinning, cropping) has resulted in a variety of modified habitats and loss of ecosystem function. Some habitat patches have multiple structural layers (e.g. overstorey, midstorey and groundcover) and other patches are heavily grazed (with diminished groundcover) and have only a single tree layer. Past disturbance and clearance has resulted in reduced abundance of tree hollows across the BNCOP Additional Footprint. Regrowth vegetation is common indicating the ecosystems still retain a moderate level of resilience.

The external connectivity of the habitats is relatively low, except for habitat along watercourses (Section 4.2.6). Nevertheless the distribution and configuration of such disconnected remnants when considered together, provide flyways for some birds and bats and movement corridors for a variety of fauna. Fragmented habitats do continue to provide varying habitat value for a range of species including birds, (e.g. Collard *et al.*, 2009) but dependent on factors such as area, shape, successional stage, resources available, remnant isolation and inherent habitat quality. Some act as ecological sources and others as ecological sinks.

The Broad Fauna Habitat Types are listed and described in Table 9 and shown on Figure 11. Detailed descriptions of the broad habitat types are provided in Attachment A. The vegetation communities that equate to each broad fauna habitat type are also listed in Table 9.

Table 9
Broad Fauna Habitat Types

	Broad Fauna Habitat Types	Short Description	Equivalent Vegetation Community
1a	Brigalow Woodland Habitat Type	This habitat type has various structural layers (overstorey, midstorey, understorey and groundcover) and habitat resources (e.g. tree hollows, hollow-bearing logs and leaf litter) however the patches are relatively small (Figure 11; Plate 1).	1a, 2
1b	Disturbed Brigalow Woodland Habitat Type	This habitat type is a degraded version of the Brigalow Woodland Habitat Type and has a simple structure of overstorey of Brigalow with no midstorey and heavily grazed understorey (Figure 11; Plates 2 and 3). This habitat is considered to be of low habitat value, particularly for reptiles.	1b, 1c
2a	Brigalow Palustrine Wetland Habitat Type	Similar to the Brigalow Woodland Habitat Type, the Brigalow Palustrine Wetland Habitat Type has various structural layers and habitat resources and also occurs in relatively small patches (Figure 11; Plate 4). No tree hollows were recorded in this habitat.	3a
2b	Disturbed Brigalow Palustrine Wetland Habitat Type	This habitat type is a degraded version of the Brigalow Woodland Habitat Type and has a simple structure of low sparse overstorey with no midstorey and heavily grazed understorey (Figure 11; Plate 5). No tree hollows were recorded in this habitat by RPS Australia East (2014) (Attachment A).	3b
3a	Riparian Woodland Habitat Type	This habitat type occurs along the Dawson River, Dawson River Anabranch and other select locations (Figure 11; Plate 7). This habitat was the most fauna species rich recorded by RPS Australia East (2014) (Attachment A) (Section 4.4.3). Riparian Woodland consists of a moderately dense canopy layer (48% cover) of large trees (22 m high and 30-55 cm DBH), a high abundance of hollow bearing trees (22 per ha), a distinct mid-storey layer but an almost absent shrub layer (0.4% cover). The groundcover comprised of fallen woody debris and leaf litter.	5, 4a, 4b
3b	Disturbed Riparian Woodland Habitat Type	This habitat was only recorded outside of the BNCOP Additional Footprint (Figure 11) and is a disturbed version of the Riparian Woodland Habitat Type. Habitat resources include limited hollow-bearing trees, fallen woody debris and leaf litter.	4c

Table 9 (Continued)
Broad Fauna Habitat Types

	Broad Fauna Habitat Types	Short Description	Equivalent Vegetation Community
4a	Eucalypt Open Forest Habitat Type	The largest patch of vegetation in the BNCOP Additional Footprint is the Eucalypt Open Forest Habitat Type, but it has been cleared in the past and regrown (Figure 11; Plates 8, 9 and 10). The structural complexity of vegetation is relatively good with multiple vegetation layers, fallen woody debris and leaf litter. This habitat consists of a moderately dense canopy layer (40% cover) of medium to large trees (19 m high and 25-40 cm DBH), a low abundance of hollow bearing trees (1 per ha), a distinct mid-storey and shrub layer (11% cover). The condition of vegetation community 8a is poor and weed cover is high (average 88% cover).	6a, 7, 8a
4b	Disturbed Eucalypt Low Open Forest Habitat Type	This habitat type has a highly simplified structure with a low and moderately dense canopy layer (9 m high and 39% cover) of small to medium sized trees (15-25 cm DBH), and a sparse shrub layer (5% cover) (Figure 11; Plate 11).	6b, 8b
5	Ephemeral Wetland Habitat Type	Ephemeral Wetland Habitat Type is associated with a palustrine wetland called the North-west Soak (Figure 11; Plate 12 following). Habitat resources include hollow-bearing trees, fallen woody debris and leaf litter.	9
6	Cleared and Disturbed Areas Habitat Type	There are variations of Cleared and Disturbed Areas as shown on Plates 13 to 16 below. Some paddocks have been ploughed (Plate 13) and others are used for grazing livestock (Plate 14). Cleared areas subject to lighter grazing contain scattered regrowth of trees and shrubs (Plate 15). Other areas have been recently cleared by the private landholders and stages remain (Plate 16).	N/A

Source: Attachment A.

Note: Highlighted cells are broad fauna habitat types within the BNCOP Additional Footprint.

Plate 12 North-west Soak - RE11.3.27i: *E. tereticornis* Palustrine Wetland = Ephemeral Wetland Habitat Type.

	Broad Habitat Type
1a	Brigalow Woodland Habitat Type
1b	Disturbed Brigalow Woodland Habitat Type
2a	Brigalow Palustrine Wetland Habitat Type
2b	Disturbed Brigalow Palustrine Wetland Habitat Type
3a	Riparian Woodland Habitat Type
3b	Disturbed Riparian Woodland Habitat Type
4a	Eucalypt Open Forest Habitat Type
4b	Disturbed Eucalypt Low Open Forest Habitat Type
5	Ephemeral Wetland Habitat Type
6	Cleared and Disturbed Areas Habitat Type

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Figure 11
Broad Fauna Habitat Types

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REV	DESCRIPTION	DATE
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1	Add Contours	20/02/14
2	Updates	26/02/14

SCALE **1:45,000**
SIZE A3
DATUM GDA 94
PROJECTION MGA Zone 55

CURRENT ISSUE SIGNATURES

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Cockatoo Coal ML.....
Existing Operational Land.....
BNCOP Operational Land.....
BNCOP Action Area.....
BNCOP Additional Footprint...
Area of Exclusion of Mining Activities.

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Plate 13 Cleared and Disturbed Areas Habitat Type (Cleared Fields).

Plate 14 Cleared and Disturbed Areas Habitat Type (Scattered Trees and Very Small Patches).

Plate 15 Cleared and Disturbed Areas Habitat Type (Regrowth).

Plate 16 Cleared and Disturbed Areas Habitat Type (Dead Stags).

Gilgai depressions (or melon-holes) are present in the BNCOP locality and have been mapped as part of the *Baralaba North Continued Operations Project EIS Soil and Land Suitability Assessment* (Soil Mapping and Monitoring, 2014). The majority of areas with gilgai soils have been extensively cleared in recent times. However, RPS Australia East (2014) (Attachment A) note that shallow gilgai are present within the Brigalow Woodland habitat type (Vegetation Community 1a) and deep gilgai are present within the Brigalow Palustrine Wetland habitat type (Vegetation Community 3a).

Plate 17 shows deep gilgai in the BNCOP Action area (within the approved Baralaba North/Wonbindi North Mine footprint). Gilgai soils are further discussed in Section 5.4.1 in relation to the Ornamental Snake.

Plate 17 Example of Strongly Developed Melon-hole Gilgai in the BNCOP Action Area.

4.4.2 Wetlands, Watercourses and Other Water Sources

An overview of the local hydrology of the BNCOP locality is described in Section 2.4. Water sources for fauna in the BNCOP Additional Footprint are limited to farm dams (one of which is shown on Figure 7 as a lacustrine wetland), ephemeral gilgai depressions (Section 4.4.1) and an ephemeral first order drainage line of the Dawson River (Figure 6).

The Dawson River, Dawson River Anabranch and the wetland to the north of the BNCOP Operational Land (Plate 18) (all outside of the BNCOP Additional Footprint) are likely to provide key sources of habitat resources for fauna in the locality due to the presence of water, older forest vegetation in the riparian habitat (with tree hollows), and there being a relatively continuous habitat corridor in the catchment.

Plate 18 Wetland to the North of the BNCOP Operational Land.

The North-west Soak is an ephemeral palustrine wetland with the vegetation community dominated by Queensland Blue Gum (*E. tereticornis*) (Plate 12). A 200 m buffer (area of exclusion of mining activities) has been established around the North-west Soak inside the BNCOP Operational Land (Figure 2). The North-west Soak has been subjected to grazing livestock.

There is one ephemeral wetland (i.e. the HESN Wetland Protection Area) that occurs in the north-east corner of the BNCOP Operational Land (Figure 7). This wetland is not associated with a regional ecosystem. A 200 m buffer (area of exclusion of mining activities) has been established around this wetland inside the BNCOP Operational Land (Figure 2).

Gilgai depressions (Section 4.4.1) also provide an ephemeral source of water.

4.4.3 Fauna Diversity and Composition

Table 10 provides a summary of the number of fauna species recorded in each fauna group by RPS Australia East (2014) (Attachment A) across the BNCOP Additional Footprint and also in the surrounding habitats, including in riparian vegetation along the Dawson River, Dawson River Anabranch and wetland to the north of the BNCOP Operational Land.

Table 10
Number of Fauna Species Recorded

Group	Number of Native Species	Number of Introduced Species	Total
Amphibians	15	1	16
Reptiles	27	0	27
Birds	136	3	139
Mammals	23	7	30
Total	**201**	**11**	**212**

The highest number of amphibian species (13 species), reptile species (21 species) and mammal species (15 species) were recorded in the Riparian Woodland Habitat Type (Attachment A). The most number of bird species were recorded in the Eucalypt Open Forest Habitat Type (62 species) (Attachment A). A complete list of native and introduced fauna species recorded by RPS Australia East (2014) is provided in Attachment A.

One introduced amphibian (the Cane Toad), three introduced birds and seven introduced mammals were recorded by RPS Australia East (2014) (Attachment A) across the BNCOP Additional Footprint and also in the surrounding habitats (Table 10).

Declared animals are listed under the LP Act and are targeted for control because they represent a threat to primary industries, natural resources and the environment. Landowners have a legal responsibility for the control of declared animals. Declared animals recorded by RPS Australia East (2014) (Attachment A) are the Feral Cat (*Felis catus*), European Rabbit (*Oryctolagus cuniculus*), Pig (*Sus scrofa*), European Red Fox (*Vulpes vulpes*) and European Hare (*Lepus europaeus*).

4.4.4 Conservation Significant Vertebrate Fauna Species

Conservation significant fauna species is a term used to describe threatened fauna species ('Extinct in the wild', Critically Endangered', 'Endangered' and 'Vulnerable') listed under the NC Act or EPBC Act, 'Near Threatened' fauna species listed under the NC Act and 'Special Least Concern' fauna species listed under the NC Act.

'Near Threatened' fauna species listed under the NC Act are species considered at risk of becoming threatened in the near future. 'Special Least Concern' fauna species listed under the NC Act are species that are common or abundant and likely to survive in the wild but have special cultural significance.

Recorded Conservation Significant Fauna Species

Two threatened species listed under the NC Act and/or EPBC Act (as 'Vulnerable') have been recorded in the BNCOP locality during recent surveys, as well as three 'Near Threatened' species and one 'Special Least Concern' mammal species (Table 11). A third threatened species listed under the NC Act and/or EPBC Act (South-eastern Long-eared Bat [*Nyctophilus corbeni*]) may occur as explained in Table 11). Migratory birds listed under international agreements (and the EPBC Act) are also 'Special Least Concern' fauna species listed under the NC Act. Migratory species are discussed in Section 4.8.

Table 11
Conservation Significant Fauna Species Recorded within the BNCOP Locality

Scientific Name	Common Name	Conservation Status[1]		Comment
		NC Act	EPBC Act	
Threatened Species				
Denisonia maculata	Ornamental Snake	V	V	The Ornamental Snake has not been recorded within the BNCOP Additional Footprint, although it was recorded three times in two areas outside the BNCOP Additional Footprint by RPS Australia East in April 2013 (Attachment A) (Figure 12). This species was recorded once within a pitfall trap in Riparian Woodland habitat (RE11.3.4) and twice within Brigalow Palustrine Wetland habitat (RE11.4.8a) via active searches (Attachment A) (Figures 11 and 12).
Geophaps scripta scripta	Squatter Pigeon (southern)	V	V	The Squatter Pigeon (southern) has been recorded throughout the BNCOP Additional Footprint and surrounding locality (on multiple occasions) during recent fauna surveys (Attachment A; Footprints Environmental Consultants, 2012) (Figure 12). The Squatter Pigeon (southern) was recorded in a number of different habitat types including Riparian Woodland, Disturbed Brigalow Palustrine Wetland, Eucalypt Open-Forest and cleared grazing paddocks (Attachment A).
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	Calls of *Nyctophilus* sp. were recorded by RPS Australia East in April and October 2013 throughout the BNCOP Additional Footprint and surrounding locality (Figure 12) (Attachment A). RPS Australia East (2014) (Attachment A) describe that the calls are more likely to be from the common long-eared bat species since the common long-eared bat species (e.g. Eastern Long-eared Bat [*Nyctophilus bifax*]) was caught in harp traps and the closest record of the South-eastern Long-eared Bat is 130 km to the north-east of the BNCOP Additional Footprint. The South-eastern Long-eared Bat was not captured in harp traps during field surveys.
Near Threatened				
Ephippiorhynchus asiaticus	Black-necked Stork	NT	-	The Black-necked Stork was recorded flying over the BNCOP Additional Footprint by RPS Australia East in April and October 2013 (Attachment A) (Figure 12) but has not been recorded on the ground.
Nettapus coromandelianus	Cotton Pygmy-goose	NT	-	The Cotton Pygmy-goose was recorded by RPS Australia East in April 2013 at two locations within the BNCOP Additional Footprint (Figure 12).
Chalinolobus dwyeri	Little Pied Bat	NT	-	Calls of the Little Pied Bat have been recorded throughout the BNCOP Additional Footprint and surrounding locality (on multiple occasions) during recent fauna surveys by RPS Australia East in April and October 2013 (Figure 12) (Attachment A). A Little Pied Bat was also caught in a harp trap at one location by RPS Australia East in April 2013.
Special Least Concern				
Tachyglossus aculeatus	Short-beaked Echidna	SLC	-	Two Short-beaked Echidna were recorded by RPS Australia East in October 2013 (Figure 12) (Attachment A).

Source: Attachment A.

[1] Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. NT=Near Threatened. SLC=Special Least Concern.

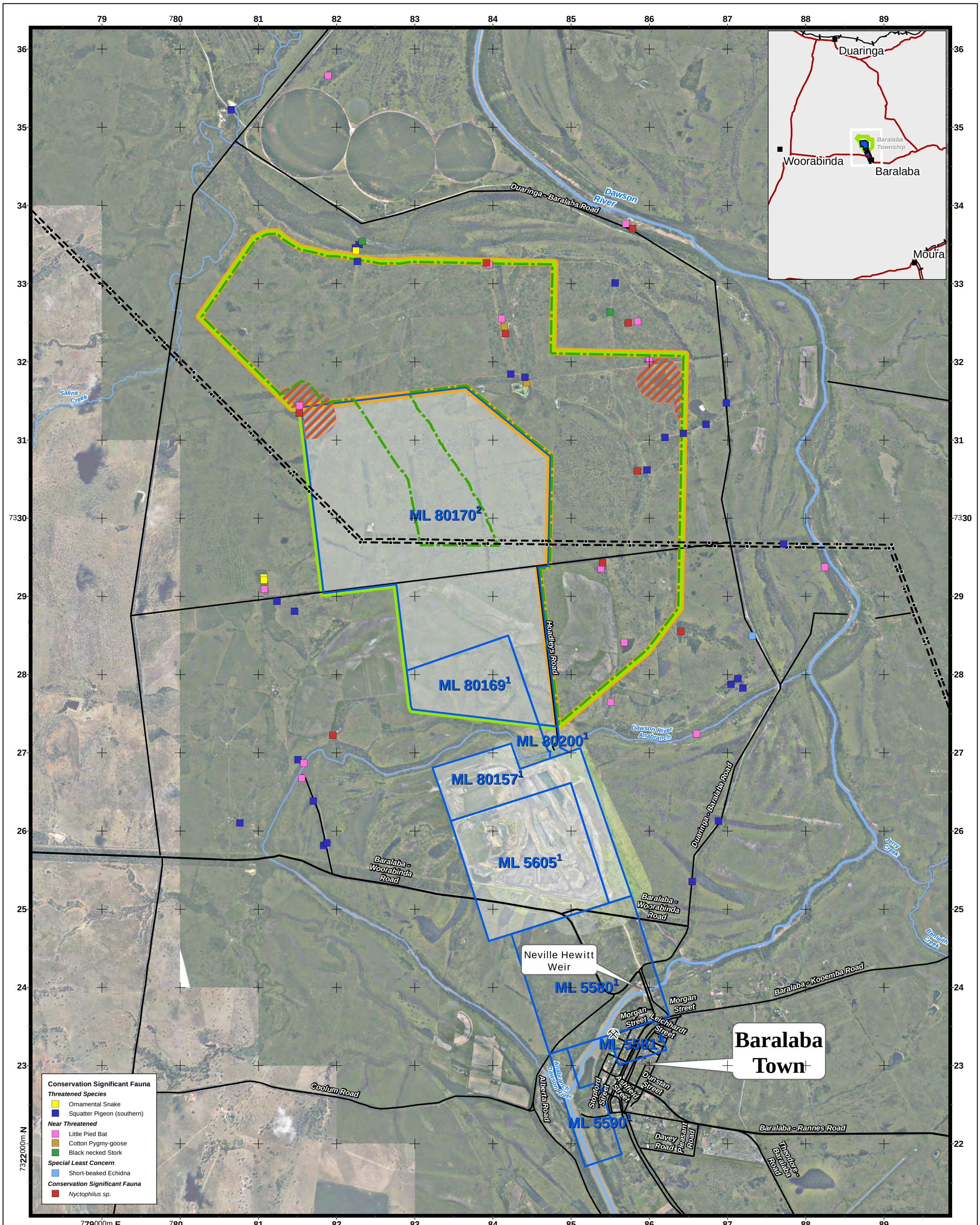

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Figure 12
Conservation Significant Fauna

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2	Data Updates	26/02/14

SCALE **1:45,000**
SIZE A3
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Watercourse.....
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BNCOP Action Area.....
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Area of Exclusion of Mining Activities.

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Potentially Occurring Conservation Significant Fauna Species

Attachment C provides a review of the conservation significant fauna species relevant to the BNCOP (produced from the database searches in Attachment B). No conservation significant amphibians are known or likely to potentially occur in the BNCOP locality (Attachment B). The following reptiles, birds and mammals are considered to have potential habitat in the BNCOP locality but have not been recorded during the targeted surveys within the BNCOP Additional Footprint or surrounding land:

- Collared Delma (*Delma torquata*) listed as 'Vulnerable' under the NC Act and EPBC Act.
- Yakka Skink (*Egernia rugosa*) listed as 'Vulnerable' under the NC Act and EPBC Act.
- Brigalow Scaly-foot (*Paradelma orientalis*) listed as 'Vulnerable' under the NC Act.
- Black-chinned Honeyeater (*Melithreptus gularis*) listed as 'Near-threatened' under the NC Act.
- Koala listed as 'Special Least Concern' under the NC Act and 'Vulnerable' under the EPBC Act.

These species are considered further in Section 5.4.8.

4.4.5 Essential Habitat

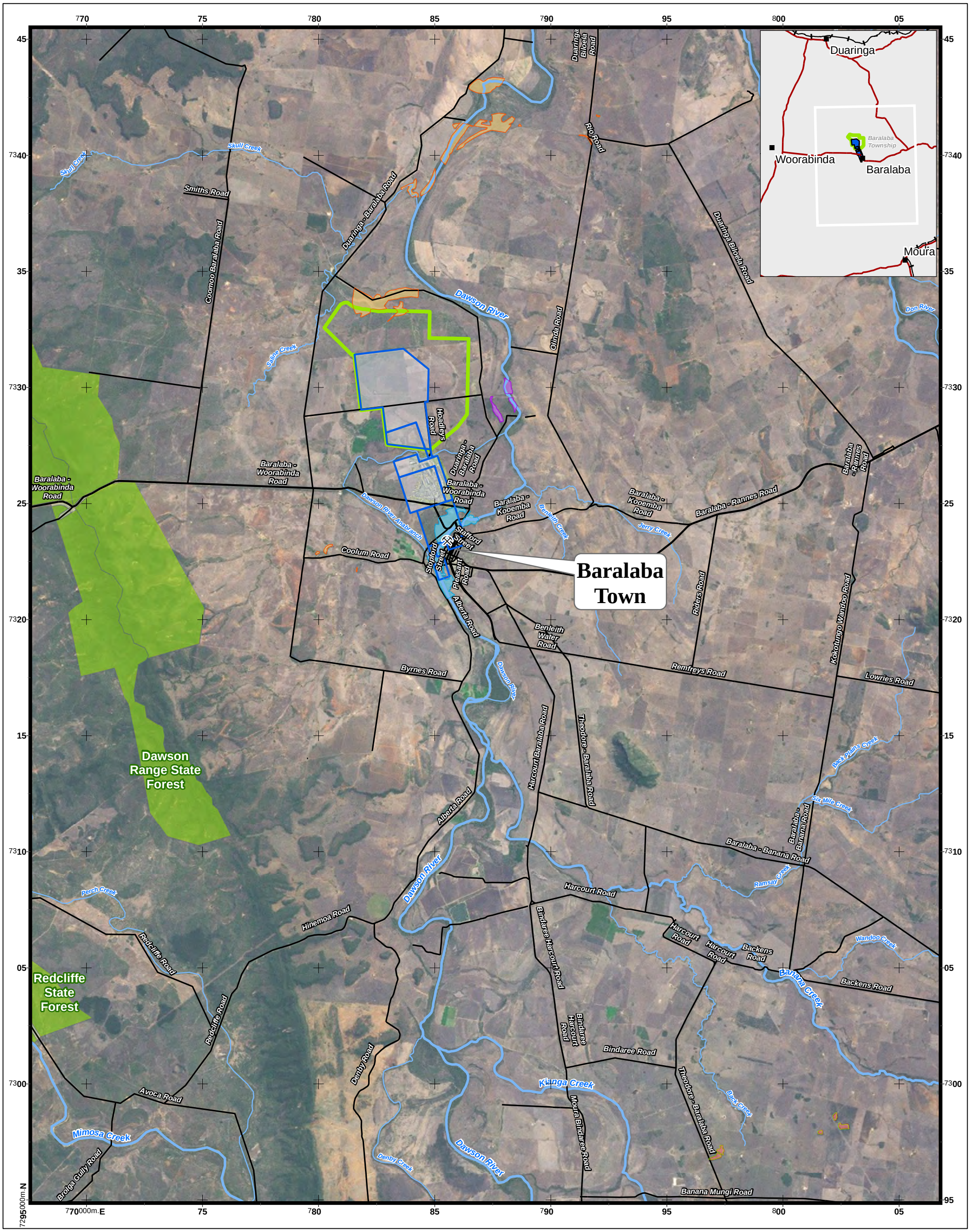
Essential habitat is defined under the VM Act as an area of remnant or HVR vegetation shown on the Regulated Vegetation Management Map (Section 4.2.1) that:

> *a) has at least three essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or*
>
> *b) in which the protected wildlife, at any stage of its lifecycle, is located.*

Approximately 24.96 ha of essential habitat for the Squatter Pigeon (*Geophaps scripta scripta*) has been mapped by DNRM (2013; 2014) on the Regulated Vegetation Management Map within the BNCOP Additional Footprint and to the north of the BNCOP Additional Footprint (Figure 13). As described in Table 11, the Squatter Pigeon was recorded throughout the BNCOP Additional Footprint and surrounding locality (on multiple occasions) during recent fauna surveys (Attachment A; Footprints Environmental Consultants, 2012) (Figure 12). There is a further 472 ha of essential habitat for the Squatter Pigeon mapped in the wider area (Figure 13).

Approximately 43 ha of essential habitat for the Brigalow Scaly-foot (listed as 'Vulnerable' under the NC Act) has been mapped by DNRM (2013; 2014) on the Regulated Vegetation Management Map outside of the BNCOP Additional Footprint, approximately 1 km to the south-east (Figure 13). The Brigalow Scaly-foot has not been recorded in the BNCOP Operational Land, despite targeted surveys (Attachment A).

There is no 'essential regrowth habitat' (i.e. HVR which is essential habitat) on the Regulated Vegetation Management Map (Figure 8a).



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TITLE			N 0 1 2 3 4 5 Kilometres			
Figure 13: Essential Habitat	REV	DESCRIPTION	DATE	SCALE **1:150,000**	CURRENT ISSUE SIGNATURES	
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	2	Data Updates	26/02/14	DATUM GDA 94	CHECKED	BJD
	3	Text Updates	14/03/14	PROJECTION MGA Zone 55	APPROVED	BJD

Legend

Road.....
Watercourse.....
Cockatoo Coal ML.....
Existing Operational Land.....
BNCOP Operational Land.....
State Forest.....

Essential Habitat

Solanum johnsonianum / Solanum dissectum / Solanum etachophyllum.
Squatter Pigeon.
Brigalow Scaly-foot.
Fitzroy River Turtle.

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STATUS **FINAL**

PROJECT NO	DRAWING NO
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4.5 MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE AND STATE SIGNIFICANT BIODIVERSITY VALUES

Matters of State Environmental Significance shown on the *State Planning Policy (SPP) Interactive Mapping System* (Department of State Development, Infrastructure and Planning [SDIP], 2014) output (Attachment D) are:

- regulated vegetation intersecting a watercourse (an ephemeral first order stream);
- wildlife habitat (also identified as Essential Habitat on the Regulated Vegetation Management Map [Section 4.4.5]);
- regulated vegetation (as shown on the Regulated Vegetation Management Map [Figure 8a]); and
- wetlands (i.e. the HESN Wetland Protection Area).

State Significant Biodiversity Values are defined in the *Queensland Biodiversity Offset Policy (Version 1) 3 October 2011* (Department of Environment and Resource Management [DERM], 2011). The Qld Government is currently reviewing the Qld environmental offset policies with a view to creating a single, integrated offset policy. However, until the review is complete, the current policies remain in effect (pers. comm. Qld Government, 2014). State Significant Biodiversity Values relevant to the BNCOP Additional Footprint are listed and defined in Table 12.

4.6 ENVIRONMENTALLY SENSITIVE AREAS

The *Environment Protection Act 1994* (Qld) (EP Act) defines Environmentally Sensitive Areas (Category A and B) and specifies limitations of mining activities on those areas. The Environmentally Sensitive Areas mapping for the location shows no Category B Environmentally Sensitive Areas in the BNCOP Additional Footprint (DEHP, 2014d) (Attachment E). Field surveys by RPS Australia East (2014) (Attachment A) identified some areas in the BNCOP Additional Footprint which could be considered to be Environmentally Sensitive Areas, namely ‘Remnant’ states of RE11.3.1 (Vegetation Community 1a) and RE11.4.8a (Vegetation Community 3a) with a biodiversity status of ‘Endangered’ (Category B Environmentally Sensitive Areas).

Table 12
State Significant Biodiversity Values

State Significant Biodiversity Values[1]		Section	Relevance
Remnant Endangered Regional Ecosystems	*Regional ecosystems which:* • *are listed in schedule 1 of the Vegetation Management Regulation 2000* • *is shown as remnant vegetation on a map* • *fits the description for the regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.2	There are two Remnant Endangered regional ecosystems in the BNCOP Additional Footprint, namely RE11.3.1 (Vegetation Community 1a) and RE11.4.8a (Vegetation Community 3a) (Figure 9).
Remnant Endangered Grassland Regional Ecosystems	*Regional ecosystems which:* • *are listed in Appendix 4 of this Policy* • *are remnant vegetation* • *fit the description for the regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.2	None (Attachment A).
Remnant Of Concern Regional Ecosystems	*Regional ecosystems which:* • *are listed in schedule 2 of the Vegetation Management Regulation 2000* • *are remnant vegetation* • *fit the description for the regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.2	There are three Remnant Of Concern regional ecosystems in the BNCOP Additional Footprint, namely RE11.3.3 (Vegetation Community 4a); RE11.3.4 (Vegetation Community 5) and RE11.3.2 (Vegetation Community 7) (Figure 9).
Remnant Of Concern Grassland Regional Ecosystems	*Regional ecosystems which:* • *are listed in Appendix 4 of this Policy* • *are remnant vegetation* • *fit the description for the regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.2	None (Attachment A).
High Value Regrowth Vegetation Containing Endangered Regional Ecosystems	*High value regrowth vegetation which:* • *contains an endangered pre-clear regional ecosystem* • *the pre-clear regional ecosystem is listed in schedule 1 of the Vegetation Management Regulation 2000* • *fits the description for the pre-clear regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.3	High value regrowth vegetation containing Endangered regional ecosystems in the BNCOP Additional Footprint are RE11.3.1 (Vegetation Community 1b and 1c) and RE11.4.8a (Vegetation Community 3b).
High Value Regrowth Vegetation Containing Of Concern Regional Ecosystems	*High value regrowth vegetation which:* • *contains an of concern pre-clear regional ecosystem* • *the pre-clear regional ecosystem is listed in schedule 2 of the Vegetation Management Regulation 2000* • *fits the description for the pre-clear regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.3	None (Attachment A).
Threshold Regional Ecosystems	*Regional ecosystems which:* • *are listed in Appendix 6 of this Policy* • *are remnant vegetation* • *fit the description for the regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.2	None (Attachment A).

Table 12 (Continued)
State Significant Biodiversity Values

State Significant Biodiversity Values[1]		Section	Relevance
Critically Limited Regional Ecosystems	*Regional ecosystems which:* • *are listed in Appendix 5 of this Policy* • *are remnant vegetation* • *fit the description for the regional ecosystem contained in the Regional Ecosystem Description Database.*	4.2.2	None (Attachment A).
Essential Habitat	*For protected wildlife, means an area of vegetation shown on the regional ecosystem map or remnant map as remnant vegetation:* *1. that has at least three essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or* *2. in which the protected wildlife, at any stage of its life cycle, is located.*	4.4.5	Approximately 24.96 ha of essential habitat for the Squatter Pigeon has been mapped by DNRM (2013; 2014) within the BNCOP Additional Footprint and to the north of the BNCOP Additional Footprint (Figure 13).
Essential Regrowth Habitat	*For protected wildlife, means an area of vegetation shown on the regrowth vegetation map as high value regrowth vegetation:* *(a) that has at least three essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential regrowth habitat database; or* *(b) in which the protected wildlife, at any stage of its life cycle, is located.*	4.4.5	None (DNRM 2014; Attachment A).
Wetland (VM Act)	*The area of land that supports plants or is associated with plants that are adapted to and dependent on living in wet conditions for at least part of their life cycle, and that is:* • *a regional ecosystem listed in a Table titled 'Wetland regional ecosystems' of the relevant Regional Vegetation Management Code for the area13 ; or* • *the area on the ground represented as a swamp, lake, marsh, waterhole, wetland, billabong, pool, spring or like represented on the most recent, finest scale:* *i. Geoscience Australia topographic map or data that shows swamps, lakes, marshes, waterholes, wetlands, billabongs, pools, springs or like, or* *ii. topographic data that represents swamps, lakes, marshes, waterholes, wetlands, billabongs, pools, springs or like—which is publicly available from the Department of Environment and Resource Management; or* *iii. listed as an 'active' spring in the Queensland Springs Database, (Queensland Wetland Data-Springs).*	4.4.2	No wetland regional ecosystems listed in the *Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions – Version 2* (DNRM, 2009) occur in the BNCOP area.

Table 12 (Continued)
State Significant Biodiversity Values

State Significant Biodiversity Values[1]		Section	Relevance
Significant Wetland (VM Act)	*(a) In the Baffle, Barron, Black, Boyne, Burdekin, Calliope, Daintree, Don, Fitzroy, Haughton, Herbert, Johnstone, Mossman, Russell-Mulgrave, Murray, O'Connell, Pioneer, Plane, Proserpine, Ross, Shoalwater, Styx, Tully and Waterpark catchments, the area of land that supports plants or is associated with plants that are adapted to and dependent on living in wet conditions for at least part of their life cycle and that is:* *i. shown as a Great Barrier Reef Wetland on the Vegetation Management Wetland Map; or* *(b) In all other catchments, the area of land that supports plants or is associated with plants that are adapted to and dependent on living in wet conditions for at least part of their life cycle and that is:* *i. a regional ecosystem listed in a Table titled 'Wetland regional ecosystems' in the relevant Regional Vegetation Management Code14 for the area and the area on the ground represented as a swamp, lake, marsh, waterhole, wetland, billabong, pool, spring or like, on the most recent 1:250 000 Geoscience Australia topographic map of the area; or* *ii. a Ramsar wetland.*	4.4.2	None (frc environmental, 2014). No wetland regional ecosystems listed in the *Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions – Version 2* (DNRM, 2009) occur in the BNCOP area.
Watercourses	*1. The area of land between the high banks of a natural channel—whether artificially improved or not—in which water flows permanently or intermittently, and that is represented as:* *(a) a creek, stream, river or watercourse at a scale of 1:100 000 on the Vegetation Management Remnant Watercourse Map; or* *(b) a creek, stream, river or watercourse at a scale of 1:250 000 on the Vegetation Management Remnant Watercourse Map where there is no 1:100 000 map available; and* *2. The remnant vegetation within the specified distance from the high banks of the watercourse identified in the relevant Regional Vegetation Management Code for the region in which the impact is occurring.*	4.4.2	A first order watercourse occurs in the north of the BNCOP Additional Footprint as shown on the Vegetation Management Wetlands Map (Figure 8b) (DNRM 2014). The *Regional Vegetation Management Code for Brigalow Belt and New England Tablelands Bioregions – Version 2* (DNRM, 2009) identifies, for Non-coastal Subregions of the Brigalow Belt Bioregion, the remnant vegetation within 50 m from the high banks of the watercourse cannot be cleared.
Connectivity	*Areas which consist of remnant or high value regrowth where the proposed impact area:* • *contains State significant biodiversity values; or* • *is within 500 meters of a State significant biodiversity value; and* • *forms an important link or stepping stone in the landscape; or* • *forms part of a patch which is five ha or greater; and* • *will compromise the function of State significant biodiversity values.*	4.2.6	The remnant vegetation in the BNCOP Additional Footprint is recognised as part of a bioregional corridor (DEHP, 2009) (Figure 6).

Table 12 (Continued)
State Significant Biodiversity Values

State Significant Biodiversity Values[1]		Section	Relevance
Protected Animals	*Endangered, vulnerable, near threatened and special least concern animals under the Nature Conservation Act 1992.*	4.4.4	Ornamental Snake Squatter Pigeon (southern) Black-necked Stork Cotton Pygmy-goose Short-beaked Echidna
Legally Secured Offset Areas Under State Legislation	*An offset area approved by the administering authority associated with a legislative or policy requirement for the provision of an offset.*	-	None (DNRM 2014; Attachment A).
Protected Plants	*Extinct in the wild, endangered, vulnerable or near threatened protected plants under the Nature Conservation Act 1992.*	4.3.2	None (Attachment A).
Wetland Protection Areas	*Means an area shown as a wetland protection area on the Map of Referrable Wetlands15, and as defined in Annex 3 of SPP 2.11.*	4.4.2	There is one wetland protection area (HESN) in the BNCOP Operational Land, in the north-east corner (Figure 7). This wetland would be avoided and therefore this State Significant Biodiversity value is not relevant to the BNCOP.

Note: Highlighted cells are relevant to the BNCOP.

[1] DERM (2011).

4.7 SUMMARY OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Threatened species and communities listed under the EPBC Act that have been recorded in the BNCOP locality are listed in Table 13.

Table 13
Threatened Species and Communities Listed under the EPBC Act that have been Recorded in the BNCOP Locality

Scientific Name	Common Name	Conservation Status[1]		Section Reference with a Description on the Record
		NC Act	EPBC Act	
Denisonia maculata	^Ornamental Snake	V	V	Section 4.4.4
Geophaps scripta scripta	^Squatter Pigeon (southern)	V	V	Section 4.4.4
Nyctophilus corbeni	*South-eastern Long-eared Bat	V	V	Section 4.4.4
^Brigalow TEC		-	E	Section 4.2.5
Coolibah-Black Box Woodland TEC		-	E	Section 4.2.5

[1] Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable E = Endangered

^ Known to occur within the BNCOP Additional Footprint/Action Area.

* The South-eastern Long-eared Bat may have been recorded in the BNCOP locality but the Anabat call recordings are not definitive (Attachment A).

Additional threatened species listed under the EPBC Act that have potential habitat in the BNCOP locality are:

- Collared Delma listed as 'Vulnerable';
- Yakka Skink listed as 'Vulnerable'; and
- Koala listed as 'Vulnerable'.

These species are considered further in Section 5.4.8.

4.8 MIGRATORY SPECIES - INTERNATIONAL AGREEMENTS

Australia participates in implementation of the following international agreements:

- *Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment* (CAMBA);
- *Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment* (JAMBA); and
- *Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds* (ROKAMBA).

Migratory species listed under the above agreements are also listed as migratory species under the EPBC Act.

Migratory species listed under the EPBC Act that were recorded by RPS Australia East (2014) (Attachment A) are the Rainbow Bee-eater (*Merops ornatus*), Satin Flycatcher (*Myiagra cyanoleuca*), Cattle Egret (*Ardea ibis*), Glossy Ibis (*Plegadis falcinellus*), Caspian Tern (*Hydroprogne caspia*) and Eastern Great Egret (*Ardea modesta*).

Migratory species are also listed under the EPBC Act and were discussed in the EPBC Act referral. Migratory species were not deemed to be a relevant controlling provision under the EPBC Act controlled action decision (Section 1.1) and as such are not discussed further in this assessment.

As noted in Section 4.4.4, migratory species listed under international agreements (and the EPBC Act) are also 'Special Least Concern' fauna species listed under the NC Act.

5 EVALUATION OF LIKELY ADVERSE IMPACTS

This section describes the potential and likely adverse impacts on terrestrial ecology from the construction, operation and eventual decommissioning of the BNCOP. The aspects of terrestrial ecology that are discussed where relevant through this section, include, but not limited to, terrestrial ecosystems, biological diversity, listed flora and fauna species and regional ecosystems, ecological processes, matters of state environmental significance and matters of national environmental significance.

5.1 LAND CLEARANCE

Land Clearance is recognised as a key threatening process under the EPBC Act (i.e. a process that threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community). Land clearance associated with the BNCOP would result in the loss of extant vegetation (Section 5.1.1), loss and fragmentation of habitat resources (Section 5.1.2) and fauna present in the areas proposed to be cleared would be at risk of injury or fatality during clearance activities (Section 5.1.3).

5.1.1 Vegetation/Regional Ecosystems

The BNCOP Additional Footprint/Action Area would require the clearance of various patches of native vegetation communities/regional ecosystems (totalling approximately 277 ha) over a period of 15 years during construction and operation (Figure 9). Progressive land clearance would be followed by staged progressive rehabilitation of the post-mine landforms (Section 6.4).

The BNCOP Operational Land is approximately 2,498 ha in area. Of the total BNCOP Additional Footprint (1,486 ha), most of the land is cleared land (approximately 1,164 ha [78%]) and some has been cleared and classed as High Value Regrowth (approximately 49.5 ha [3.3%]). The BNCOP Action Area contains approximately 154 ha of additional cleared land (total of 1,640 ha).

The location of the proposed BNCOP pit would require clearance of two patches of Vegetation Community 8a (a 'Least Concern' regional ecosystem under the VM Act) (Figure 9). The majority of vegetation clearance would be required for the placement of spoil and infrastructure (Figures 3 and 9). The spoil dumps and infrastructure are located next to the proposed BNCOP pit to minimise the overall footprint of the mine (and reduce cartage of spoil).

The native vegetation communities/regional ecosystems to be cleared are all more widely occurring in the surrounding landscape and subregion (after Accad *et al.,* 2013) (Table 14). The boundary of the Dawson River Downs IBRA subregion and Woorabinda IBRA subregion runs through the BNCOP Operational land, so the amount of extant remnant vegetation (of each regional ecosystem) in each subregion is presented in Table 14. Some regional ecosystems are more prevalent in one IBRA subregion than the other.

As described in Section 4.2.2, RPS Australia East (2014) (Attachment A) ground-truthed the regional ecosystems in the BNCOP locality to rectify inaccuracies in the DEHP (2014f) regional ecosystem mapping. As a result, 141 ha of additional remnant vegetation occurs in the BNCOP Additional Footprint that is not accounted for in the subregional totals in Table 14. Regulated vegetation (as shown on the Regulated Vegetation Management Map [Figure 8a]) is a Matter of State Environmental Significance (Attachment D).

A description of the vegetation clearance is provided below.

Table 14
Native Vegetation Clearance

	#	Vegetation Community	State	VM Act	Biodiversity Status	EPBC Act	Approximate Area (ha) to be Cleared (Figure 9)	Total Area Mapped by RPS Australia East (2014) (Attachment A) (Figure 9)	Total Area Remnant Mapped In the Woorabinda IBRA Subregion (Accad *et al.*, 2013)	Total Area Remnant Mapped In the Dawson River Downs IBRA Subregion (Accad *et al.*, 2013)
Brigalow Woodland	1a	RE11.3.1: *Acacia harpophylla* ± *Eucalyptus populnea* Open Forest to Woodland[1]	Remnant	Endangered	Endangered	Endangered	2.5	14	260	1,177
	1b	RE11.3.1: *A. harpophylla* Disturbed Low Open Forest	Disturbed HVR	Endangered	-	-	11	21	-	-
	1c	RE11.3.1: *A. harpophylla* Low Open Forest	HVR	Endangered	-	-	0.5	7	-	-
						Endangered	0	19		
Brigalow Palustrine Wetland	2	RE11.4.8: *E.cambageana* and *A.harpophylla* Open Forest to Woodland[1]	Remnant	Endangered	Endangered	Endangered	0	15	359	1,612
	3a	RE11.4.8a: *A. harpophylla* Palustrine Wetland[1]	Remnant	Endangered	Endangered	Endangered	2.5	20		
	3b	RE11.4.8a: *A. harpophylla* Disturbed Palustrine Wetland[1]	HVR	Endangered	-	-	8	0	-	-
						Endangered	4	45		
Riparian Woodland	4a	RE11.3.3: *E. coolibah* Open Forest to Woodland[2]	Remnant	Of Concern	Of Concern	Endangered	0*	70	93	5,409
	4b	RE11.3.3: *E. coolibah* Disturbed Open Forest to Woodland	Disturbed Remnant	Of Concern	Of Concern	-	0	107		
	4c	RE11.3.3: *E. coolibah* Low Open Forest to Woodland	HVR	Of Concern	-	-	0	15	-	-
	5	RE11.3.4: *E. tereticornis* and *Corymbia tesselaris* Open Forest	Remnant	Of Concern	Of Concern	-	5	427	12,995	3,059

Table 14 (Continued)
Native Vegetation Clearance

	#	Vegetation Community	State	VM Act	Biodiversity Status	EPBC Act	Approximate Area (ha) to be Cleared (Figure 9)	Total Area Mapped by RPS Australia East (2014) (Attachment A) (Figure 9)	Total Area Remnant Mapped In the Woorabinda IBRA Subregion (Accad *et al.*, 2013)	Total Area Remnant Mapped In the Dawson River Downs IBRA Subregion (Accad *et al.*, 2013)
Eucalypt Open Forest	6a	RE11.5.5: *E. populnea* ± *E. melanophloia* ± *E. cambageana* ± *C. tesselaris* Open Forest	Remnant	Least Concern	No Concern at Present	-	2.5	66	9,224	0
	6b	RE11.5.5: *Callitris glaucophylla* Low Open Forest	Remnant	Least Concern	No Concern at Present	-	0	24		
	7	RE11.3.2: *E. populnea* ± *E. melanophloia* Open Forest	Remnant	Of Concern	Of Concern	-	63	181	14,621	11,676
	8a	RE11.5.9: *E. melanophloia* ± *E. crebra* ± *C. intermedia* ± *C. dallachiana* Open Forest	Remnant	Least Concern	No Concern at Present	-	152	274	28,033	415
	8b	RE11.5.9: *E. melanophloia* ± *E. crebra* ± *C. intermedia* ± *C. dallachiana* Low Open Forest	HVR	Least Concern	-	-	26	96	-	-
Ephemeral Wetland	9	RE11.3.27i: *E. tereticornis* Palustrine Wetland	Remnant	Least Concern	Of Concern	-	0	4	236	305
						Total	**277**	**1,405**	**-**	**-**

Note: Highlighted cells are vegetation communities within the BNCOP Additional Footprint. Due to recent reforms, high value regrowth does not have a 'Biodiversity Status' unless it on leasehold land for agriculture or grazing. The BNCOP is on freehold land.

* These areas exclude the 'areas of exclusion of mining activities' shown on Figure 9 as well as the Coolibah-Black Box Woodland TEC in the BNCOP Operational Land that would be avoided and not cleared (Section 6.1).

[1] Patches of Brigalow TEC are shown on Figure 10.

[2] Patches of Coolibah-Black Box Woodland TEC are shown on Figure 10.

Brigalow Woodland

A total of approximately 14 ha of Brigalow Woodland would be cleared for the BNCOP, comprising (Table 14; Figure 9):

- one 2.5 ha patch of remnant woodland (Vegetation Community 1a);
- two patches of disturbed high value regrowth (a single patch approximately 4.5 ha in size and a second patch of approximately 16 ha of which approximately 6.5 ha occurs within the BNCOP Additional Footprint/Action Area) (Vegetation Community 1b); and
- one patch of high value regrowth (approximately 0.5 ha) (Vegetation Community 1c).

A total of approximately 47 ha of Brigalow Woodland has been mapped by RPS Australia East outside of the BNCOP Additional Footprint/Action Area (Table 14; Figure 9).

All occurrences of Brigalow Woodland (RE11.3.1) are listed as 'Endangered' under the VM Act (and have a biodiversity status of 'Endangered'), however only a single 2.5 ha patch of remnant woodland is listed as the Brigalow TEC under the EPBC Act (Table 14; Figure 9). The likely adversely impacts on the Brigalow TEC are assessed in Section 5.6.2.

As described in Section 4.6, the Environmentally Sensitive Areas mapping for the location shows no Category B Environmentally Sensitive Areas in the BNCOP Additional Footprint (DEHP, 2014d) (Attachment E), however, field surveys identified some areas in the BNCOP Additional Footprint which could be considered to be Environmentally Sensitive Areas, namely 'Remnant' states of RE11.3.1 (Vegetation Community 1a) and RE11.4.8a (Vegetation Community 3a) with a biodiversity status of 'Endangered' (Category B Environmentally Sensitive Areas) (Attachment A).

Brigalow Palustrine Wetland

A total of approximately 14.5 ha of Brigalow Palustrine Wetland would be cleared for the BNCOP, comprising (Table 14; Figure 9):

- a single 2.5 ha patch of remnant vegetation (Vegetation Community 3a);
- three patches of high value regrowth (approximately 4 ha of a larger patch that extends outside of the northern boundary of the BNCOP Additional Footprint/Action Area [Vegetation Community 3b];
- a single patch approximately 7.4 ha (Vegetation Community 3b); and
- a single patch approximately 0.6 ha (Vegetation Community 3b).

All occurrences of Brigalow Palustrine Wetland (RE11.4.8) are listed as 'Endangered' under the VM Act (and have a biodiversity status of 'Endangered'), however the Brigalow TEC under the EPBC Act is represented by the single 2.5 ha patch of remnant vegetation and the 4 ha patch of high value regrowth (Table 14; Figure 9). The likely adverse impacts on the Brigalow TEC are assessed in Section 5.6.2.

Riparian Woodland

Three patches of riparian woodland (Vegetation Community 5 - RE11.3.4) occur in the BNCOP Additional Footprint/Action Area, totalling approximately 5 ha (Table 14; Figure 9). This Riparian Woodland is listed as 'Of Concern' under the VM Act (and has a biodiversity status of 'Of Concern').

The 2.5 ha patch of Coolibah-Black Box Woodland TEC (Vegetation Community 4a - RE11.3.3) in the BNCOP Operational Land would be avoided and not cleared (Section 6.1).

Eucalypt Open Forest

The main form of vegetation that would be disturbed for the BNCOP is Eucalypt Open Forest (approximately 243.5 ha [approximately 88%]) and most regional ecosystems of Eucalypt Open Forest are 'no concern at present' under the VM Act (except approximately 63 ha of RE11.3.2 which is listed as 'Of Concern' under the VM Act (and has a biodiversity status of 'Of Concern') (Table 14; Figure 9).

An ephemeral first order stream runs through this vegetation which is mapped as 'Regulated Vegetation Intersecting a Watercourse' on the *SPP Interactive Mapping System* (SDIP, 2014).

Measures to Avoid and Mitigate the Impact

The following measures would be adopted to reduce the adverse impacts from land clearance:

- avoidance of particular features (Section 6.1);
- vegetation clearance procedures, including delineating clearance areas (Section 6.2); and
- continuous and staged post mining rehabilitation (Section 6.4).

Summary

The native vegetation communities/regional ecosystems to be cleared occur more widely in the surrounding landscapes and subregions (Table 14). It would be possible to compensate for the residual impacts (after the above listed avoidance and mitigation measures have been implemented) by providing:

1. an offset strategy which specifically benefits the vegetation communities/regional ecosystems that would be impacted by the BNCOP, particularly conservation significant Brigalow dominated communities; and
2. implementing a staged rehabilitation/restoration program on the post mining landscape, and providing for the formation of dynamic successional habitats, moving towards a rehabilitated woodland-forest landscape with many of the values of un-impacted similar native vegetation.

5.1.2 Habitat Removal

Habitat Resources

The native vegetation communities/regional ecosystems proposed to be cleared for the BNCOP provide habitat resources for fauna species. The approximate area of broad fauna habitat types proposed to be cleared in the BNCOP Additional Footprint/Action Area are outlined in Table 15. The four main habitat types in the BNCOP Additional Footprint/Action Area include (in order of dominance): Eucalypt Open Forest Habitat Type; Brigalow Palustrine Wetland Habitat Type; Brigalow Woodland Habitat Type and Riparian Woodland Habitat Type and as well as disturbed versions of these habitats (Figure 11).

As described in Section 5.1.1, most of the land in the BNCOP Additional Footprint/Action Area is cleared (Table 15). The greatest area of fauna habitat proposed to be removed is the Eucalypt Open Forest Habitat, located towards the north of the BNCOP Additional Footprint/Action Area (Figure 11). This habitat is weakly connected to the vegetated wetland to the north of the BNCOP Operational Land (Plate 18; Figure 11).

All of the broad fauna habitats mapped in the BNCOP Additional Footprint/Action Area were mapped more extensively by RPS Australia East (Table 15; Figure 11) and the associated regional ecosystems are more widely occurring in the subregions (after Accad *et al.,* 2013) (Table 14).

Table 15
Habitat Clearance

#	Broad Habitat Type	Approximate Area (ha) to be Cleared in the BNCOP Additional Footprint (Figure 11)	Total Area Mapped by RPS Australia East (2014) (Attachment A) (Figure 11)
1a	Brigalow Woodland Habitat Type	2.5	29
1b	Disturbed Brigalow Woodland Habitat Type	11.5	47
2a	Brigalow Palustrine Wetland Habitat Type	2.5	20
2b	Disturbed Brigalow Palustrine Wetland Habitat Type	12	45
3a	Riparian Woodland Habitat Type	5	604
3b	Disturbed Riparian Woodland Habitat Type	0	15
4a	Eucalypt Open Forest Habitat Type	217.5	521
4b	Disturbed Eucalypt Low Open Forest Habitat Type	26	120
5	Ephemeral Wetland Habitat Type	0	4
	Subtotal	*277*	*1,405*
6	Cleared and Disturbed Areas	1,164 ha in the BNCOP Additional Footprint and 1,318 ha in the BNCOP Action Area	

* These areas exclude the 'areas of exclusion of mining activities' shown on Figure 11 as well as the Coolibah-Black Box Woodland TEC in the BNCOP Operational Land that would be avoided and not cleared (Section 6.1).

Note: Highlighted cells are vegetation communities within the BNCOP Additional Footprint.

Essential Habitat - Wildlife Habitat

As described in Section 4.4.5, approximately 472 ha of essential habitat for the Squatter Pigeon (Southern) (*Geophaps scripta scripta*) has been mapped by DNRM (2013; 2014) within the Baralaba locality (Figure 12). Approximately 24.96 ha of essential habitat for the Squatter Pigeon (Southern) is mapped within the BNCOP Additional Footprint and to the north of the BNCOP Additional Footprint (Figure 13). The essential habitat for the Squatter Pigeon (Southern) is also mapped as 'Wildlife Habitat', a Matter of State Environmental Significance on the *SPP Interactive Mapping System* (SDIP, 2014) (Attachment D). The Squatter Pigeon (Southern) is further discussed in Section 5.4.4.

Water Sources

The BNCOP would largely avoid impacts on wetlands, watercourses and other water sources in the landscape since the BNCOP avoids direct impacts on the wetland to the North of the BNCOP Operational Land, the North-west Soak (inside the BNCOP Operational Land), the Dawson River, Dawson River Anabranch and Saline Creek.

A 200 m buffer (area of exclusion of mining activities) has been established to avoid direct impacts on the North-west Soak, (Figure 2). Indirect impacts on the North-west Soak would be nil-negligible as described in Section 5.2.1. Similarly, a 200 m buffer (area of exclusion of mining activities) would be established to avoid direct impacts on the HESN Wetland Protection Area in the north-east corner of the BNCOP Operational Land, (Figure 2). Again, indirect impacts on the wetland protection area (HESN) would be nil-negligible as described in Section 5.2.1. As previously noted, the HESN wetland protection area is a Matter of State Environmental Significance (Attachment D).

As described in Section 4.4.2, water sources in the BNCOP Additional Footprint are limited to farm dams (one of which is shown on Figure 7 as a lacustrine wetland), gilgai depressions, and an ephemeral first order drainage line of the Dawson River (which is mapped as 'Regulated Vegetation Intersecting a Watercourse' on the *SPP Interactive Mapping System* [SDIP, 2014]) (Figure 8b). Clearance of these water sources is not likely to significantly impact any fauna species.

Habitat Connectivity

As described in Section 4.2.6, the remnant vegetation in the BNCOP Additional Footprint is highly fragmented though a portion on the periphery is recognised as part of a bioregional corridor (DEHP, 2009) (Figure 6). The bioregional corridor follows the Dawson River and would not be adversely impacted by the BNCOP. The land clearance required for the BNCOP would reduce some habitat connectivity (physical links and stepping stones) but the connectivity between surrounding habitats would be largely unchanged.

As described in Section 6.4, the rehabilitation objectives are not specifically aimed at providing a movement corridor for wildlife, although that would be a necessary consequence of such action for many species but not all. All mine disturbance areas would be revegetated/rehabilitated to create a woodland/forest habitat with some of the values of un-impacted native woodlands and forests, in a staged sequence thereby also creating a range of successional habitats. This would likely result in more extensive woodland/forest landscape (compared to the currently fragmented habitats), greater connectivity of habitats either side of the BNCOP, a likely increase overtime in species diversity and a significant increase in habitat values compared with the pre-mining landscape.

Habitat – Species Diversity

Forest Red Gum communities (which make up the majority of the Riparian Woodland Habitat Type in the BNCOP) occur on the moist nutrient rich parts of the landscape (Smith and Hogan, 2013). The highest number of amphibians (13 species), reptiles (21 species) and mammals (15 species) were recorded in the Riparian Woodland Habitat Type (Section 4.4.3) which would be largely avoided by the BNCOP (99.2% of the Riparian Woodland Habitat Type on Figure 11 is outside of the BNCOP Additional Footprint).

Animal Breeding Places

The BNCOP would disturb animal breeding places and therefore CCL would need to comply with the NC Act requirements, by preparing a Species Management Program (under section 332 of the Nature Conservation (Wildlife Management) Regulation 2006).

Measures to Avoid and Mitigate the Impact

The following measures would be adopted to reduce the adverse impacts from habitat removal:

- avoidance of particular features (Section 6.1);
- vegetation clearance procedures, including delineating clearance areas (Section 6.2);
- measures outlined in a Species Management Program (Section 6.3); and
- rehabilitation and restoration of the post mining landscape in a staged sequence (Section 6.4).

Summary

The native vegetation communities and habitats to be cleared occur more widely in the surrounding landscapes and subregions (Tables 14 and 15). The species that use or are likely to use the habitats in the BNCOP Additional Footprint are a subset of the more widely occurring species assemblages and populations.

It would be possible to compensate for the residual impacts (after the above listed avoidance and mitigation measures have been implemented) by providing:

1. an offset strategy which specifically benefits the vegetation communities/regional ecosystems that would be impacted by the BNCOP, particularly conservation significant Brigalow dominated communities; and
2. implementing a staged rehabilitation/restoration program on the post mining landscape, and providing for the formation of dynamic successional habitats, moving towards a rehabilitated woodland-forest landscape with many of the values of un-impacted similar native vegetation.

5.1.3 Fauna and Clearance Activities

Fauna present in the areas proposed to be cleared would be at risk of injury or fatality during clearance activities. The risk to fauna would be determined by the method of clearance, type of fauna present, amount of clearance and the presence of surrounding suitable habitat to accommodate displaced fauna. These aspects are discussed below.

A staged and controlled land clearance method would be adopted. Land clearance would occur progressively over 15 years and only in areas required for mining activities within the following year.

Fauna at greatest risk during clearance activities in the BNCOP Additional Footprint would be arboreal fauna, hollow-dwelling fauna, nesting birds, sedentary species, small animals and slow moving animals (e.g. reptiles). The habitat to be cleared would be subject to targeted pre-clearance surveys for these faunal groups and their habitats. Fauna or habitat features identified during the pre-clearance surveys would be managed to minimise injury to resident fauna during clearance activities as part of the Environmental Management Plan (Section 6).

All of the broad fauna habitats mapped in the BNCOP Additional Footprint were mapped more extensively by RPS Australia East (Table 15; Figure 11). However, many habitats are highly fragmented and located on agricultural land so their capacity to accommodate displaced fauna is likely to vary from little to none to relatively small numbers. However some individuals of some species, particularly the more mobile, would likely find suitable locations in the wider landscape. Others may perish and some would be confined to sink habitats where they would be unlikely to breed. Notwithstanding, the fauna species in the BNCOP Additional Footprint exist in a highly fragmented landscape and appear to be more prevalent outside of the BNCOP Additional Footprint.

Measures to Avoid and Mitigate the Impact

Vegetation clearance procedures to reduce the adverse impacts from clearance activities on resident fauna are described in Section 6.2. Declared animal control strategies would be implemented as necessary (Section 6.5) potentially reducing pressure on displaced native animals.

5.2 INDIRECT IMPACTS

Potential indirect impacts from the BNCOP are discussed below, including changes in surface water/groundwater and ecosystems, exotic flora and declared plants, declared animals, dust, noise, artificial lighting, traffic movements, final landform (and integrity of the landscape), risk of contamination and bushfire.

Ecological processes are the processes that sustain functioning ecosystems (habitats for conservation significant species). Some impact pathways can result in an indirect impact on terrestrial ecosystems by disrupting ecological processes. For example, potential impacts on hydrological processes can impact terrestrial ecosystems (e.g. groundwater dependant vegetation) (Section 5.2.1). The potential impacts on the integrity of ecological processes are noted in this section, where relevant.

5.2.1 Changes in Surface Water/Groundwater and Ecosystems

Changes to surface water quality and quantity can have an indirect impact on ecosystems surrounding a development site. A decrease in the quality of surface water to habitats surrounding the BNCOP could occur if runoff from disturbed areas, stockpiles and/or waste rock emplacements is uncontrolled or through accidental release of contaminants.

Surface Water Quality

The surface water assessment (supported by site water balance modelling) by WRM Water and Environment (2014) concludes that:

- No uncontrolled spills of mine-affected water from the Mine Water Dam or Process Water Dam are predicted.
- Some overflow of treated water from sediment dams (designed in accordance with the Best Practice Erosion and Sediment Control guideline [Institute for Environmental Monitoring and Research, 2008]) may occur during wet periods, however it is unlikely that this would have a measurable impact on receiving water quality.
- There is a predicted negligible impact on the downstream water quality through controlled releases from the BNCOP.

Based on the implementation of management strategies (e.g. erosion and sediment controls and land contamination controls) and monitoring recommended in the Geochemistry Assessment (Terrenus Earth Sciences, 2014), the risks of elevated dissolved solids and other contaminants impacting downstream waters is considered to be low (WRM Water and Environment, 2014).

If no measurable impacts on surface water quality are likely to occur, no adverse impacts are likely to occur on surrounding habitats.

Surface Water Quantity

During active mining operations, the mine water management system would capture runoff from areas that would have previously flowed to the receiving waters of Saline Creek, the Dawson River Anabranch and wetland to the north of the BNCOP Operational Land. The maximum captured catchment areas during the life of the BNCOP were determined by WRM Water and Environment (2014) as follows:

- approximately 0.01% of the Dawson River catchment (to Beckers stream gauge);
- <1% of Saline Creek catchment; and
- approximately 52% of the wetland to the north of the BNCOP Operational Land.

At the completion of mining, surface runoff from rehabilitated overburden emplacement areas would be released from the site, therefore, the captured catchment areas would reduce.

It is however recognised that the wetland to the north of the BNCOP Operational Land is periodically inundated by flood backflow from the Dawson River and Saline Creek (better than 50% chance each year), and therefore the predicted maximum changes in catchment would not result in a directly proportional change in the flow regime (WRM Water and Environment, 2014).

Post-mining, the captured catchment areas would reduce and there would be no measurable change in the Dawson River catchment.

Groundwater Drawdown

Changes to groundwater quality and quantity can have an indirect impact on ecosystems surrounding a development site and particularly ecosystems that are dependant or partially dependant on groundwater. The use of groundwater by vegetation is an ecological process that sustains groundwater dependant vegetation. As described in Section 4.2.4, groundwater is shallow (less than 5 m) in portions of the BNCOP Additional Footprint and surrounds, mostly along watercourses such as the Dawson River, Dawson River Anabranch (HydroSimulations, 2014). The groundwater base flow to the Dawson River and Dawson River Anabranch may sustain the riparian vegetation in addition to surface water inflows.

In regards to changes to groundwater quality and quantity, the *Groundwater Modelling and Assessment* (HydroSimulations, 2014) concludes that:

- potential impacts on base flow contributions to downstream features would be limited; and
- there is not expected to be any measurable changes in the quality of groundwater as a consequence of mining.

If no measurable impacts on surface water quantity or quality are likely to occur from changes in groundwater (drawdown), no adverse impacts are likely to occur on surrounding habitats (Dawson River, Dawson River Anabranch or wetland to the north of the BNCOP Operational Land).

Measures to Avoid and Mitigate Potential Impacts

Clearing of native vegetation would be undertaken progressively over 15 years and only in areas required for mining activities within the following year. This would have the effect of minimising the area of exposed land. Measures to reduce the likelihood of adverse impacts from erosion and sedimentation are briefly outlined in Section 6.9.

Summary

No adverse water-related impacts are likely to occur on habitats surrounding the Dawson River and the Dawson River Anabranch. While the catchment reporting to the Northern Wetland would be reduced (i.e. approximately 23% post-mining), it is recognised that there is a better than 50% chance each year that the Northern Wetland will experience flood inflows from Saline Creek regardless of the reduction in catchment area.

No measurable impacts on surface water quality are likely to occur from changes in surface water and no measurable impacts on surface water quantity or quality are likely to occur regardless of changes in captured catchment areas and groundwater (drawdown).

5.2.2 Exotic Flora and Declared Plants

Exotic flora can degrade native vegetation communities. *Novel Biota and their Impact on Biodiversity* is a key threatening process under the EPBC Act. As previously described, the BNCOP is situated in agricultural land with improved pastures and weed species occur extensively in the locality. However, without weed management, there is a potential for existing exotic flora (and declared plants under the LP Act) to become more prevalent or for new weeds to be introduced into the area. Activities that could spread weeds during construction and operation include soil disturbance, vehicle movements and movement of soil. Disturbed areas (including those undergoing rehabilitation) provide a substrate in which weed species may grow.

Measures to Avoid and Mitigate Potential Impacts

Management measures to prevent and control exotic flora and declared plants are described in Section 6.6. Landowners have a legal responsibility for the control of declared plants under the LP Act.

5.2.3 Declared Animals

Declared animals under the LP Act are known to occur in the BNCOP locality (European Rabbit, European Hare, European Red Fox, Feral Cat and Feral Pig) (Section 4.4.3). These declared animals have corresponding key threatening processes under the EPBC Act, namely, *Competition and Land Degradation by Rabbits*; *Predation by European Red Fox*; *Predation by Feral Cats*; *Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs.*

Activities associated with the BNCOP may provide increased refuge and scavenging resources (e.g. discarded food scraps) for these species, unless appropriately managed to discourage exotic animals.

Measures to Avoid and Mitigate Potential Impacts

Landowners have a legal responsibility for the control of declared animals under the LP Act. Management measures to prevent and control declared animals are described in Section 6.5.

5.2.4 Dust

Dust is generated at the existing Baralaba Coal Mine and would be generated from the approved Baralaba North/Wonbindi North Mine. The BNCOP would result in an increase in dust (Todoroski Air Sciences, 2014) that could settle on surrounding habitats. Dust that settles on plants could potentially inhibit their photosynthetic processes, leading to a decrease in vigour. The dust may also reduce the palatability of the plants to herbivorous fauna.

The landscape surrounding the BNCOP is extensively cleared. Dust from the BNCOP is unlikely to significantly degrade surrounding habitats given habitats in the locality are fragmented and already subjected to dust from exposed soils in the cleared landscape. It is also likely that seasonal rainfall in the locality would help wash dust from the vegetation and/or encourage new growth.

Dust would be created during construction and operation of the BNCOP over 15 years. After decommissioning of the mine and revegetation, dust levels would return to similar pre-mining levels.

Measures to Mitigate Potential Impacts

Measures to reduce dust are detailed in *Baralaba North Continued Operations Project Air Quality Assessment* (Todoroski Air Sciences, 2014) and are summarised in Section 6.9.

5.2.5 Noise

A number of recent literature reviews have been conducted on the effects of noise on wildlife (Radle, 2007; Kaseloo, 2005; Institute for Environmental Monitoring and Research, 2001). Noise can potentially adversely impact certain fauna species, although studies on the effect of noise on wildlife have shown very variable responses to potential impacts. Many fauna readily habituate to increases in noise levels, particularly when they are repeated at intervals.

Noise is generated at the existing Baralaba Coal Mine and would be generated from the approved Baralaba North/Wonbindi North Mine. The BNCOP would result in a further increase in noise during the day and night (Simpson Engineering Group, 2014). Similar to the existing Baralaba Coal Mine and the approved Baralaba North/Wonbindi North Mine, noise emissions associated with the BNCOP would originate predominantly from mobile equipment, processing plant and coal handling. In addition, the mining method requires the drilling and blasting of overburden (Simpson Engineering Group, 2014).

There is limited habitat surrounding the BNCOP that would be subjected to noise. Later in the mine life, waterbirds that use wetland to the north of the BNCOP Operational Land may take flight in response to sudden loud noises (blasting). However, the impact is likely to be temporary. Any adverse impact from noise on other fauna or their habitat is likely to be localised and comparatively minor compared to the main impact of habitat loss.

Measures to Mitigate Potential Impacts

Measures to mitigate noise are detailed in *Baralaba North Continued Operations Project Noise and Vibration Assessment* (Todoroski Air Sciences, 2014) and are summarised in Section 6.9.

5.2.6 Artificial Lighting

Similar to the existing Baralaba Coal Mine and the approved Baralaba North/Wonbindi North Mine, the BNCOP would operate during the day and night, and therefore artificial lighting would be required. Artificial lighting for the BNCOP has the potential to affect the behavioural patterns of some fauna species. For example, some bird and bat species are attracted to insects that swarm around artificial lights.

Measures to Mitigate Potential Impacts

Management measures to minimise the use of artificial lighting are described in Section 6.9.

5.2.7 Traffic Movements

The BNCOP involves the progressive development of new haul roads and internal roads as mining develops. Vehicular traffic movements would occur through staff, contractors and visitors entering the site as well as vehicle movements whilst on-site. The workforce is expected to increase from 190 people to 380 people.

Additional vehicular traffic movements associated with exploration, construction and operation of the BNCOP have the potential to result in the injury or mortality of some fauna species. In generally, the risk of injury or fatality from vehicle strike is greatest where roads cross vegetated corridors or other specific fauna movement corridors. There are no such vegetated corridors in the BNCOP Additional Footprint, but there remains a moderate risk to fauna with unpredictable movements.

The BNCOP involves continued road transport of product coal along the “Middle Road” to the product coal stockpiles and TLO facility located approximately 10 km east of Moura, or new product coal stockpiles and TLO facility (subject to separate approvals being in place) (Figure 4). Given this public road network already exists, the additional use of the road for the BNCOP likely poses minimum additional risk to fauna.

Measures to Mitigate Potential Impacts

Management measures to reduce the risk to vertebrate fauna by vehicular strike are described in Section 6.9.

5.2.8 Final Landform – Integrity of the Landscape

The post-mine landform would be progressively rehabilitated as described in Section 6.4. The integrity of the landscape would be maintained by providing safe and stable post-mining landforms with a minimum vegetation cover of 70%.

Similar to the approved Baralaba North/Wonbindi North Mine, a final void would remain at the end of the mine life (covering the extent of the pit shown on the figure in Section 6.4). Final voids are a common end result of coal mining operations. Once mining operations cease, the void would gradually begin to fill with water, with the salinity of the final void predicted to slowly increase over time. However, a long-term hydraulic sink would minimise the potential migration of poor quality groundwater from within the mine pit to other areas (HydroSimulations, 2014). The final void would be designed to prevent overflow to the downstream watercourses.

The final void would be managed by:

- partial backfilling designed to minimise the potential for environmental harm to the Dawson River floodplain; and
- installing safety bunds and/or fencing.

A Void Management Plan would be prepared for the BNCOP. The Void Management Plan would, as a minimum, include final landform capability study to support native flora and fauna.

5.2.9 Risk of Contamination

The BNCOP does not involve the use of substances that are likely to cause bioaccumulation in fauna or involve the exposure of wastes that could pose a risk to fauna (e.g. no tailings dams).

5.2.10 Bushfire

The majority of the BNCOP is located on areas of ‘medium bushfire risk’ with limited areas of ‘high bushfire risk (Rural Fire Service Queensland and Queensland Fire and Rescue Service, 2008). A change in natural fire frequency can impact natural ecosystems. For example, intense fire is a risk to Brigalow Woodland (e.g. Bulter and Fairfax, 2008).

Accidental bushfires can potentially start in a variety of ways at the BNCOP if not appropriately managed (e.g. from machinery or vehicles traversing dry grass).

Measures to Mitigate Potential Impacts

Bushfire prevention and management measures are described in Section 6.8.

5.3 CUMULATIVE IMPACTS

Cumulative impacts are considered to be the total impact on the environment that would result from the incremental impacts of the BNCOP added to other existing impacts. They include direct and indirect impacts. In this assessment we also consider cumulative impacts from proposed (but not yet existing) developments in the local area.

As described in Section 2.1, the Brigalow Belt Bioregion in Qld has the second lowest area of remaining native vegetation for a region in Qld with 41.6% of the original vegetation remaining (Accad *et al.,* 2013). Land in the Baralaba district is predominately used for rural activities including dairy farming, beef cattle grazing and fattening, and limited crop cultivation. Existing infrastructure in the BNCOP Additional Footprint includes: farm dams, fencing, access tracks and transmission lines.

CCL operates the existing Baralaba Coal Mine (ML80157 and ML5605) and the approved Baralaba North/Wonbindi North Mine (ML80169 and ML80170) (Figure 2). The approved Baralaba North/Wonbindi North Mine footprint is mostly cleared land (QTree, 2011; Footprints Environmental Consultants, 2011b). The new product coal stockpiles and TLO facility (subject to separate approvals being in place) are also considered contributors to the cumulative impacts.

There are no other existing coal mines nearby. The nearest operating coal mine in the region is the Dawson Mine located approximately 45 km south-east of the BNCOP. The Dawson Mine is operated and managed by Anglo American. The Belvedere Coal Project was proposed by the Belvedere Joint Venture (comprising Vale Australia Pty Ltd and Aquila Resources Ltd) approximately 30 km south of the BNCOP, however the project was withdrawn from the EIS process in October 2012 and the 'significant project' declaration was repealed by the Coordinator-General on 30 October 2012. The Baralaba South Coal Project was proposed by CCL approximately 15 km south of the BNCOP, however, the BNCOP is preferred over this project by CCL.

As described in Section 5.1.1, the native vegetation communities/regional ecosystems to be cleared during the life of this project, occur more widely occurring in surrounding landscapes and subregions (after Accad *et al.,* 2013) (Table 14). The boundary of the Dawson River Downs IBRA subregion and Woorabinda IBRA subregion runs through the BNCOP Operational land. The amount of extant remnant vegetation (of each regional ecosystem) in each subregion is presented in Table 14. The proposed clearance equates to between 0.02% to 0.6% of the extant remnant regional ecosystems in the combined Dawson River Downs and Woorabinda IBRA subregions.

The cumulative impacts on conservation significant species listed under the EPBC Act are described in Section 5.4.

5.4 CONSERVATION SIGNIFICANT SPECIES

No conservation significant flora species listed under the NC Act and/or EPBC Act have been located in the BNCOP locality and therefore it is unlikely that any conservation significant flora species would be impacted by the BNCOP.

Conservation significant fauna species that are known or considered likely to occur in the BNCOP Additional Footprint are listed in Table 16. These seven species are considered likely to be affected to some degree by the BNCOP, either through loss of known or potential habitat and/or direct loss of individuals. Species that are known to occur in the BNCOP Additional Footprint are noted with an asterix in Table 16. Other conservation significant fauna species have been included in Table 16 that are considered likely to occur on the basis that potential habitat resources (feeding, breeding, shelter, etc.) in the BNCOP Additional Footprint and the species is known to occur in habitat adjacent to the BNCOP Additional Footprint.

Table 16
Conservation Significant Fauna Species that are Known or Considered Likely to Occur in the BNCOP Additional Footprint

Scientific Name	Common Name	Conservation Status[1]	
		NC Act	EPBC Act
Reptiles			
Denisonia maculata	Ornamental Snake	V	V
Birds			
Geophaps scripta scripta	^Squatter Pigeon (southern)	V	V
Ephippiorhynchus asiaticus	Black-necked Stork	NT	-
Nettapus coromandelianus	^Cotton Pygmy-goose	NT	-
Mammals			
Tachyglossus aculeatus	Short-beaked Echidna	SLC	-
Chalinolobus dwyeri	^Little Pied Bat	NT	-
Nyctophilus corbeni	*South-eastern Long-eared Bat	V	V

^ Known to occur within the BNCOP Additional Footprint/Action Area.

* The South-eastern Long-eared Bat (*Nyctophilus corbeni*) may have been recorded in the BNCOP locality but the Anabat call recordings are not definitive, allowing positive identification to extend only to the genus *Nycophilus* (Attachment A).

1 Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. NT=Near Threatened. SLC=Special Least Concern.

Table 17 contains other conservation significant fauna species that are not known or considered likely to occur in the BNCOP Additional Footprint, but some potential habitat for these species would be impacted by the BNCOP. These species may also occur in the areas surrounding the BNCOP Additional Footprint and hence the potential for indirect impacts on these species has been assessed.

Table 17
Conservation Significant Fauna Species that are not Known or Considered Likely to Occur in the BNCOP Additional Footprint

Scientific Name	Common Name	Conservation Status[1]	
		NC Act	EPBC Act
Reptiles			
Delma torquate	Collared Delma	V	V
Egernia rugosa	Yakka Skink	V	V
Paradelma orientalis	Brigalow Scaly-foot	V	-
Birds			
Melithreptus gularis	Black-chinned Honeyeater	NT	-
Mammals			
Phascolarctos cinereus	Koala (combined populations of Qld, New South Wales [NSW] and Australian Capital territory [ACT])	SLC	V

1 Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. NT=Near Threatened. SLC=Special Least Concern.

Adverse impacts on conservation significant species from the BNCOP area assessed in consideration of the:

- ToR for the BNCOP*;* and
- *Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DotE, 2013a).

Species Listed under the Nature Conservation Act 1992 (Qld)

The likely adverse impacts on conservation significant species listed under the NC Act are described in this section in consideration of the ToR for the BNCOP*.*

As required by the *Queensland Biodiversity Offset Policy (Version 1) 3 October 2011* (DNRM, 2011), the assessment have been made following a review of known distribution, published information of ecological requirements for each species and also published information of home range requirements and mobility relevant to a determination of minimum viable habitat area and dispersal capabilities of each species.

Species Listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act listed threatened fauna species that are known or considered likely to occur in the BNCOP Additional Footprint (Table 16) or otherwise listed in Table 17 are 'Vulnerable' under the EPBC Act. The *Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DotE, 2013a) state that **"**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*[6] *of a species*
- *reduce the area of occupancy of an important population*
- *fragment an existing important population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of an important population*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*
- *introduce disease that may cause the species to decline, or*
- *interfere substantially with the recovery of the species.*

The direct and indirect potential adverse impacts on each threatened fauna species are assessed. In consideration of the ToR for the BNCOP, adverse impacts from the BNCOP on these species is initially assessed for each species followed subsequently by an assessment of the cumulative impacts related to all known and proposed similar developments (and other developments which could potentially adversely impact the species).

[6] *An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:*

- *key source populations either for breeding or dispersal*
- *populations that are necessary for maintaining genetic diversity, and/or*
- *populations that are near the limit of the species range.*

The landscape distribution of relevant EPBC Act listed threatened fauna species are shown on Figures 14 to 18. The air photo (aerial imagery) is shown on these figures to indicate habitat in which the species has been recorded in a landscape context.

Terminology

There are a number of specific terms that should be noted when reading each assessment and are defined below.

Potential habitat is an area which may be used by the species as habitat but where the species has not been found.

Known habitat is an area of habitat where the species has been found.

Essential Habitat as defined under the VM Act is an area of remnant or HVR vegetation shown on the Regulated Vegetation Management Map (Section 4.4.5).

There are various definitions of **Important Habitat** defined by DotE policies (e.g. DotE, 2013a; SEWPaC, 2011a). Relevant definitions are provided in the following threatened species assessments.

Habitat critical to the survival of a species or ecological community (for an EPBC Act listed threatened species) *refers to areas that are necessary:*

- *for activities such as foraging, breeding, roosting, or dispersal,*
- *for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators),*
- *to maintain genetic diversity and long term evolutionary development, or*
- *for the reintroduction of populations or recovery of the species or ecological community.*

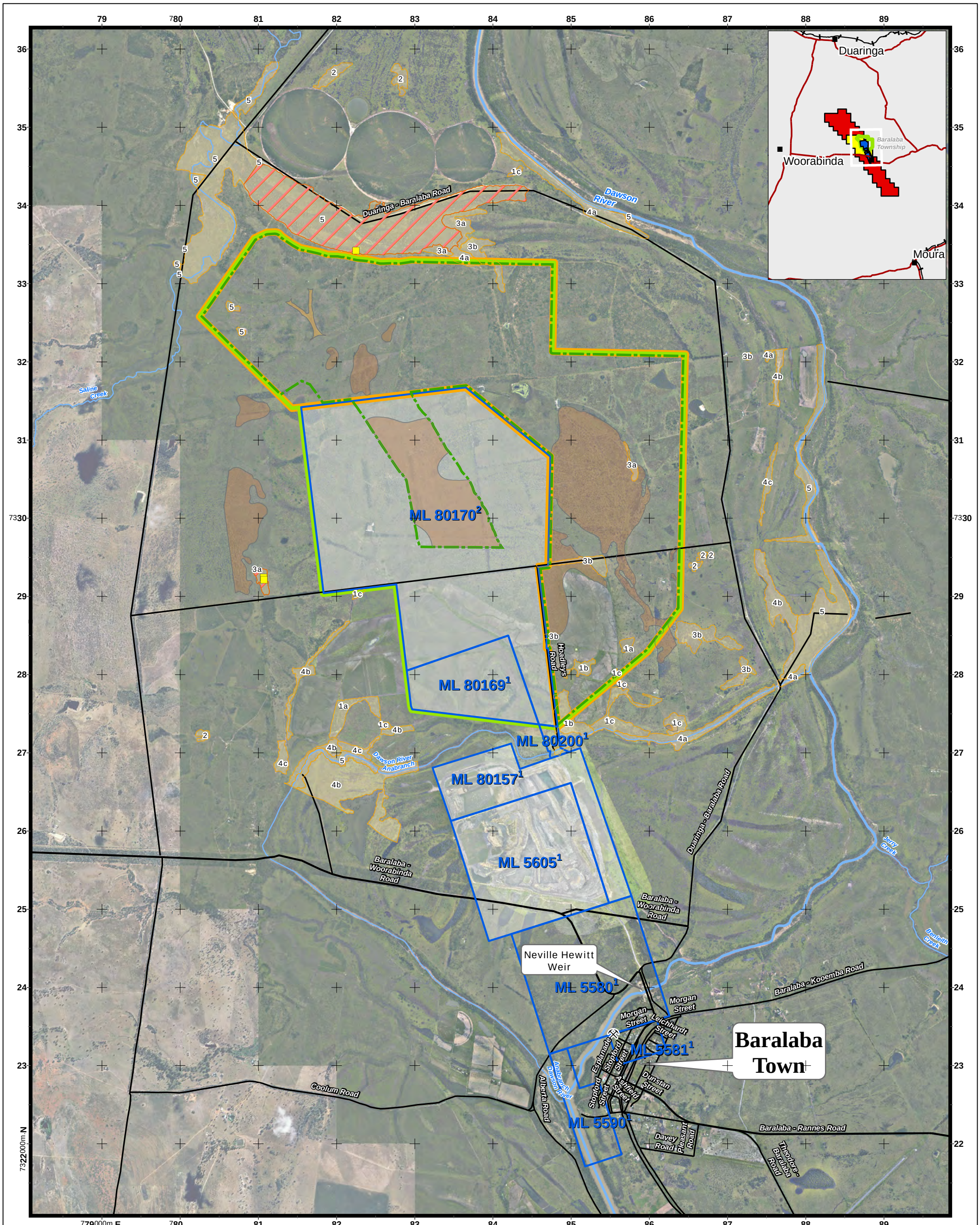
Critical Habitat is also defined under the NC Act as:

> *habitat that is essential for the conservation of a viable population of protected wildlife or community of native wildlife, whether or not special management considerations and protection are required. Critical habitat may include an area of land that is considered essential for the conservation of protected wildlife, even though the area is not presently occupied by the wildlife*.

Significant impact is defined by DotE as:

> *an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.*

The potential impacts on conservation significant species listed under the NC Act are assessed in relation to the **BNCOP Additional Footprint**, and the potential impacts on threatened species listed under the EPBC Act are assessed in relation to the **BNCOP Action Area**.



PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.			N 0 500 1,000 1,500 2,000 Metres		DATA SOURCES: VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA. SOIL MAPPING AND MONITORING, 2014 *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.* *NOTE:* *¹ : HELD BY BARALABA COAL PTY LTD* *² : HELD BY WONBINDI COAL PTY LTD*
TITLE **Figure 14** **Ornamental Snake Potential Habitat**	REV	DESCRIPTION	DATE	SCALE **1:45,000** SIZE A3 DATUM GDA 94 PROJECTION MGA Zone 55	CURRENT ISSUE SIGNATURES DRAWN MJS CHECKED BJD APPROVED BJD	**Legend** Road..... Watercourse..... Powerline & Power Pole. Cockatoo Coal ML..... Ornamental Snake Records..... Ornamental Snake Important Habitat. Ornamental Snake Potential Habitat. Existing Operational Land..... BNCOP Operational Land..... BNCOP Action Area..... BNCOP Additional Footprint... Soil Type with: Strongly Developed Melon-hole Gilgai Weak Gilgai.....
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STATUS **FINAL**

PROJECT NO Baralaba Nth

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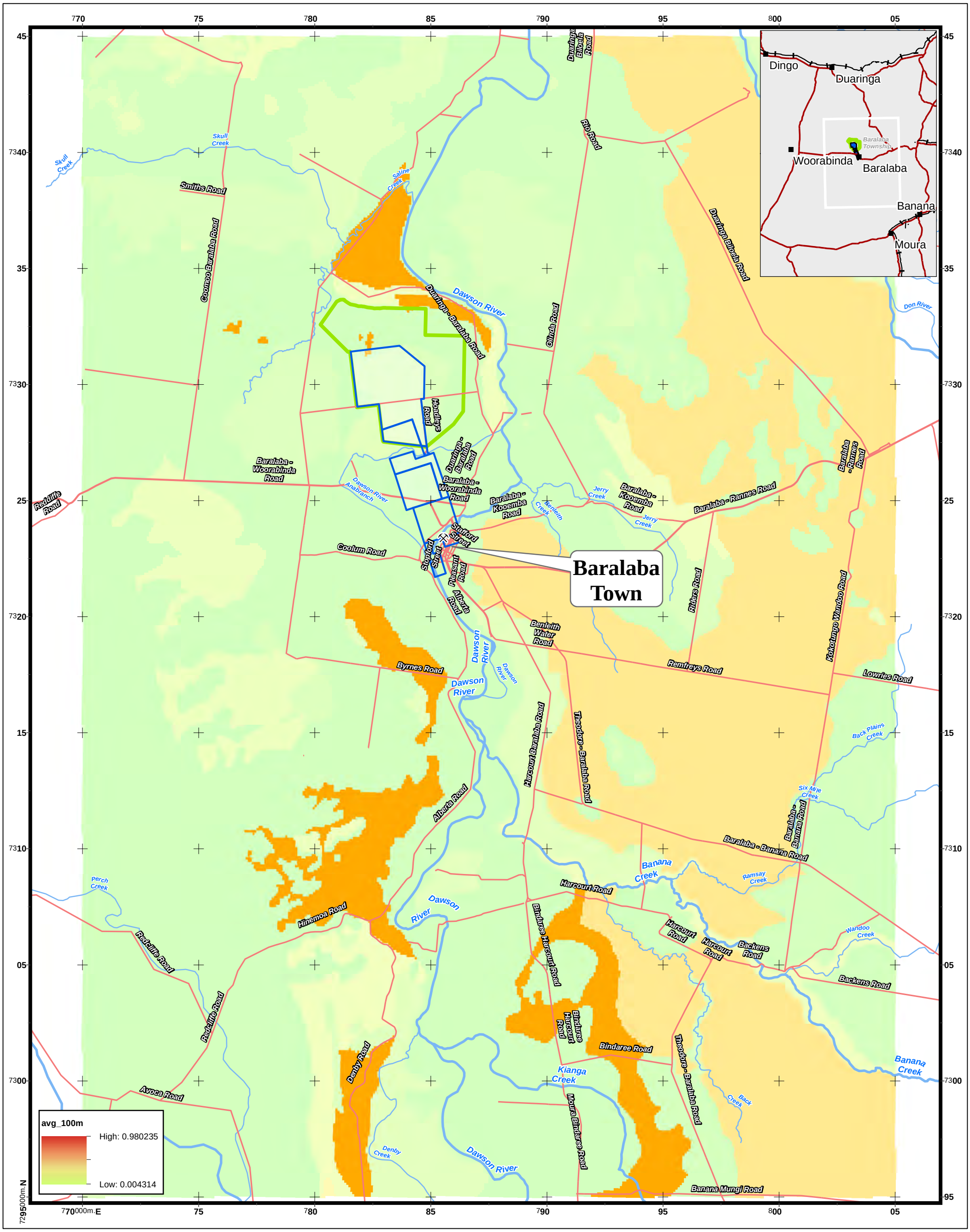

PROJECT: **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.	N; 0 2 4 6 Kilometres	DATA SOURCES: VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA. FOOTPRINTS ENVIRONMENTAL CONSULTANTS, 2014 *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	*NOTE:* *1 : HELD BY BARALABA COAL PTY LTD* *2 : HELD BY WONBINDI COAL PTY LTD*	Cockatoo Coal Limited	
TITLE: **Figure 15a Regional Ecosystem Only Predicted Distribution of the Ornamental Snake**	REV / DESCRIPTION / DATE: 0 Original map output 04/03/14; 2 Text Updates 13/03/14; 3 Text Updates 04/04/14	SCALE **1:150,000**; SIZE A3; DATUM GDA 94; PROJECTION MGA Zone 55	Legend: Road, Watercourse, Cockatoo Coal ML, Existing Operational Land, BNCOP Operational Land	CURRENT ISSUE SIGNATURES: DRAWN MJS; CHECKED BJD; APPROVED BJD	STATUS: **FINAL**	PROJECT NO: Baralaba Nth; DRAWING NO: BBN-098-23-03-140404

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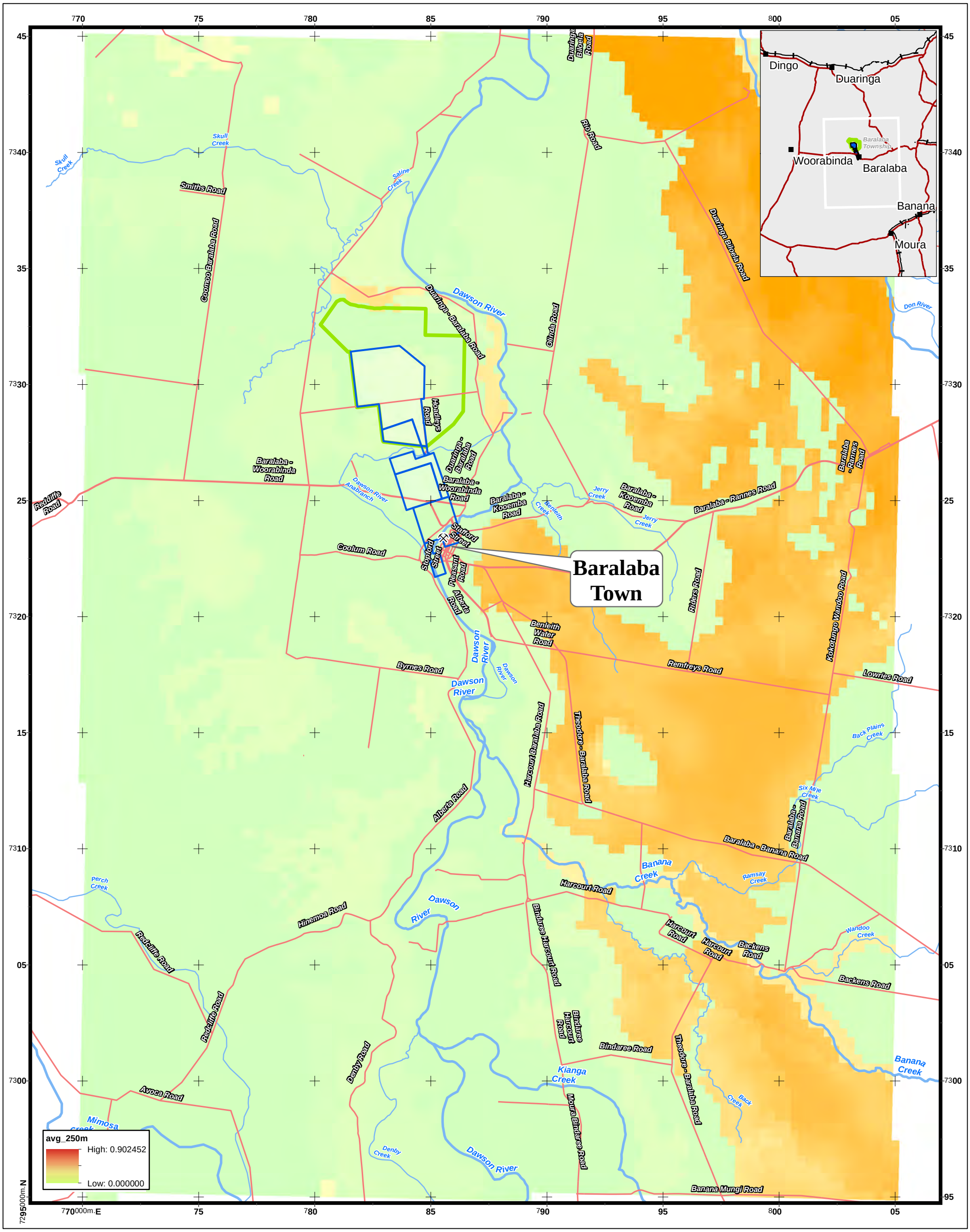

PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.			N 0 2 4 6 Kilometres	DATA SOURCES: VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA. FOOTPRINTS ENVIRONMENTAL CONSULTANTS, 2014 *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	*NOTE:* *¹: HELD BY BARALABA COAL PTY LTD* *²: HELD BY WONBINDI COAL PTY LTD*
TITLE **Figure 15b Combined Model Predicted Distribution of the Ornamental Snake**	REV	DESCRIPTION	DATE	SCALE **1:150,000**	CURRENT ISSUE SIGNATURES	
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	2	Text Updates	13/03/14	DATUM GDA 94	CHECKED	BJD
	3	Text Updates	04/04/14	PROJECTION MGA Zone 55	APPROVED	BJD

Legend

Road.....
Watercourse.....
Cockatoo Coal ML.....
Existing Operational Land.....
BNCOP Operational Land.....

Cockatoo Coal Limited

STATUS **FINAL**

PROJECT NO	DRAWING NO
Baralaba Nth	BBN-098-24-04-140404

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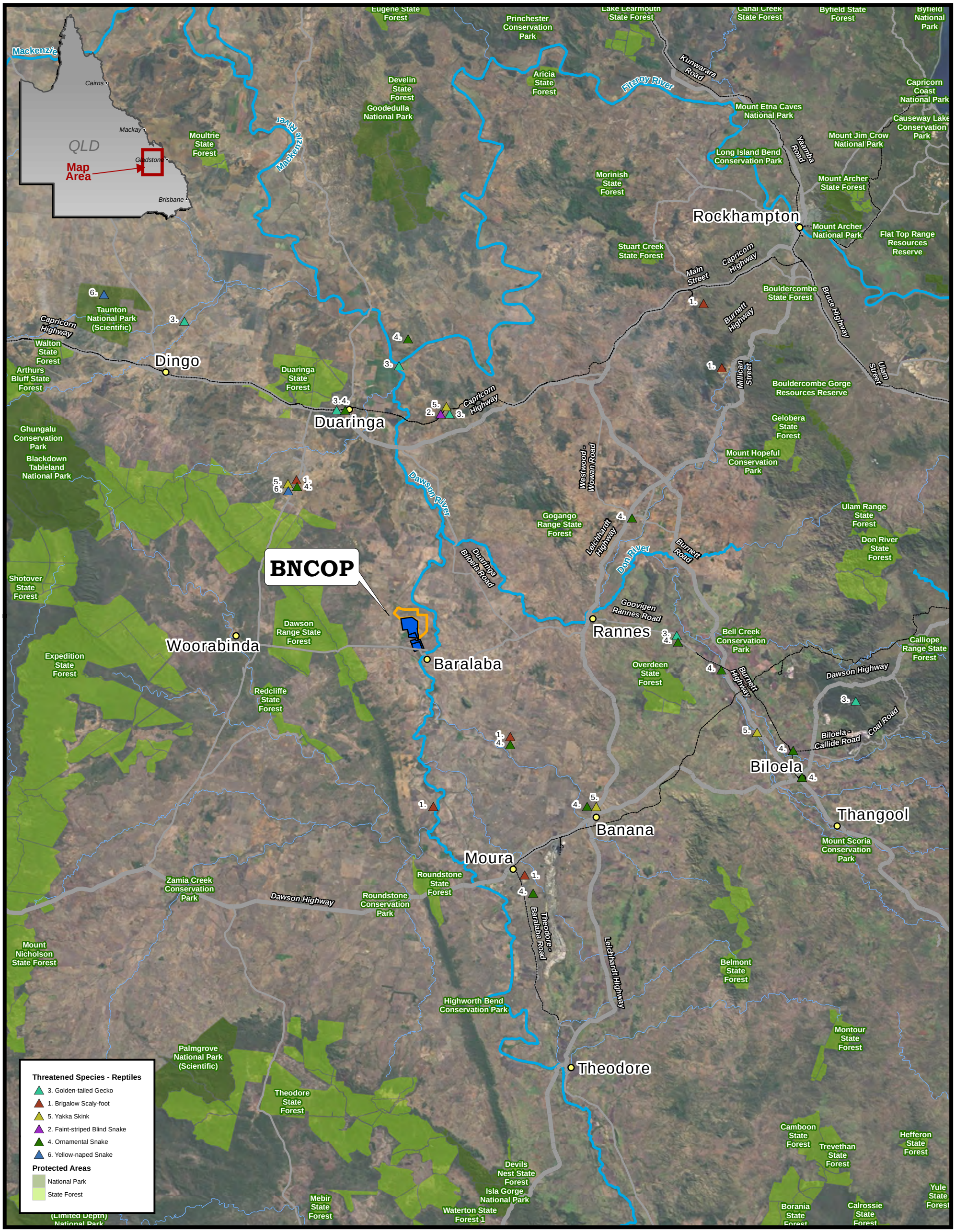

PROJECT: **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.			N; 0 10 20 30 Kilometres	DATA SOURCES: RASTER DATA: ESRI, I-CUBED, USDA, USGS, AEX, GEOEYE, GETMAPPING, AEROGRID, IGN, IGP AND THE GIS USER COMMUNITY VECTOR DATA: © DERM - LAND & PROPERTY DATA, © GEOSCIENCE AUSTRALIA, QLD MUSEUM, 2014 & ALA, 2014 *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	Cockatoo Coal Limited
TITLE: **Figure 16 Significant Reptiles Landscape Distribution**	REV: 0 / 2 / 3	DESCRIPTION: Original map output / Update Data / Update Text	DATE: 10/02/14 / 26/02/14 / 13/03/14	SCALE: **1:750,000**; SIZE: A3; DATUM: GDA 94; PROJECTION:	CURRENT ISSUE SIGNATURES: DRAWN MJS; CHECKED BJD; APPROVED BJD	Legend: Populated Place, Road, Rail, Watercourse, Cockatoo Coal ML, BNCOP Additional Footprint	STATUS: **FINAL**; PROJECT NO: Baralaba Nth; DRAWING NO: BBN-098-06-03-140313

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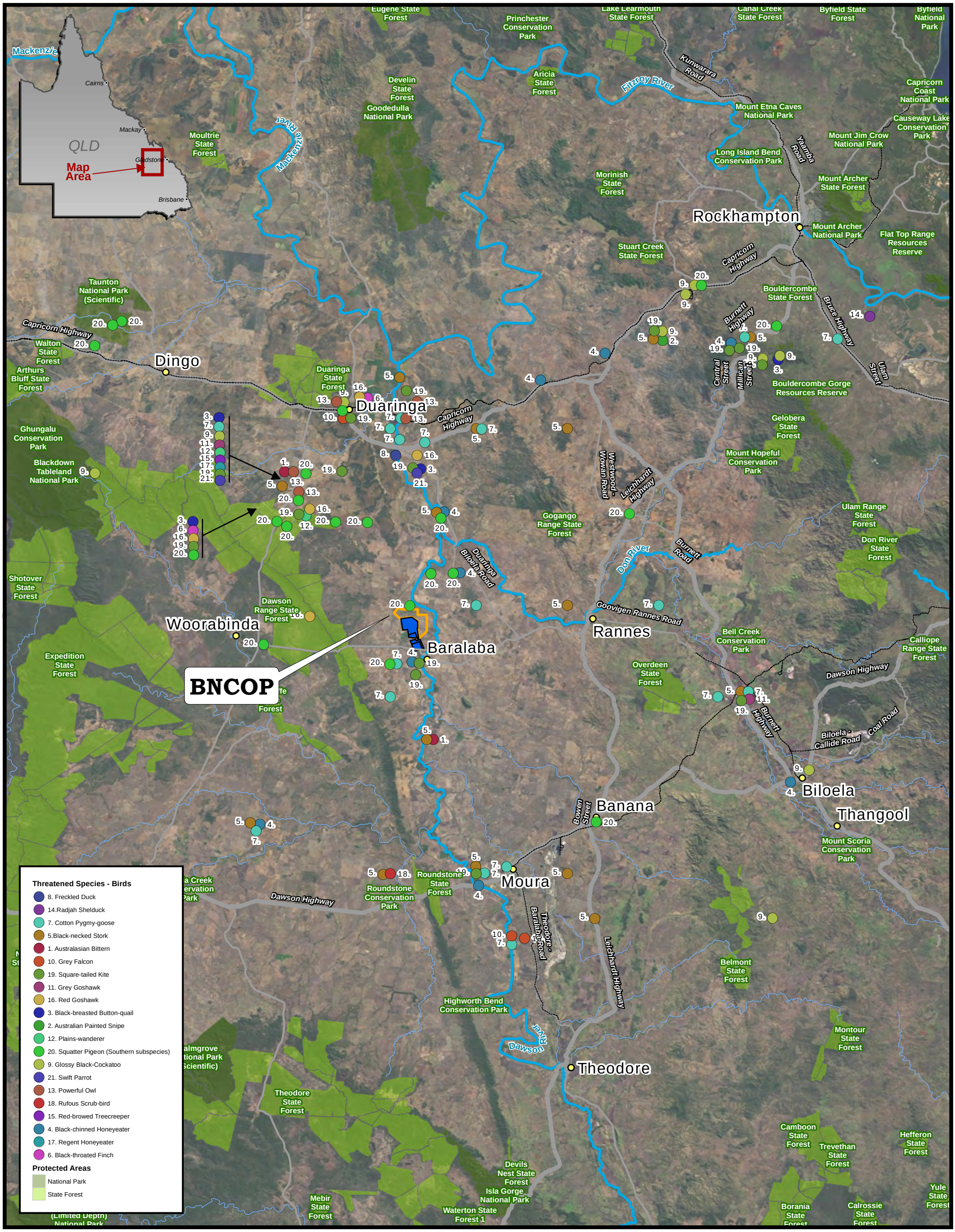

PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.		N 0 10 20 30 Kilometres		DATA SOURCES: RASTER DATA: ESRI, I-CUBED, USDA, USGS, AEX, GEOEYE, GETMAPPING, AEROGRID, IGN, IGP AND THE GIS USER COMMUNITY VECTOR DATA: © DERM - LAND & PROPERTY DATA, © GEOSCIENCE AUSTRALIA, QLD MUSEUM, 2014, BIRDS AUSTRALIA, 2014 & ALA, 2014 *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	Cockatoo Coal Limited
TITLE **Figure 17 Significant Birds Landscape Distribution**	REV / DESCRIPTION / DATE 0 Original map output 10/02/14 2 Update Data 26/02/14 3 Update Text 13/03/14		SCALE **1:750,000** SIZE A3 DATUM GDA 94 PROJECTION	CURRENT ISSUE SIGNATURES DRAWN MJS CHECKED BJD APPROVED BJD	Legend Populated Place..... Road..... Rail..... Watercourse..... Cockatoo Coal ML..... BNCOP Additional Footprint...	STATUS **FINAL** PROJECT NO Baralaba Nth DRAWING NO BBN-098-07-03-140313

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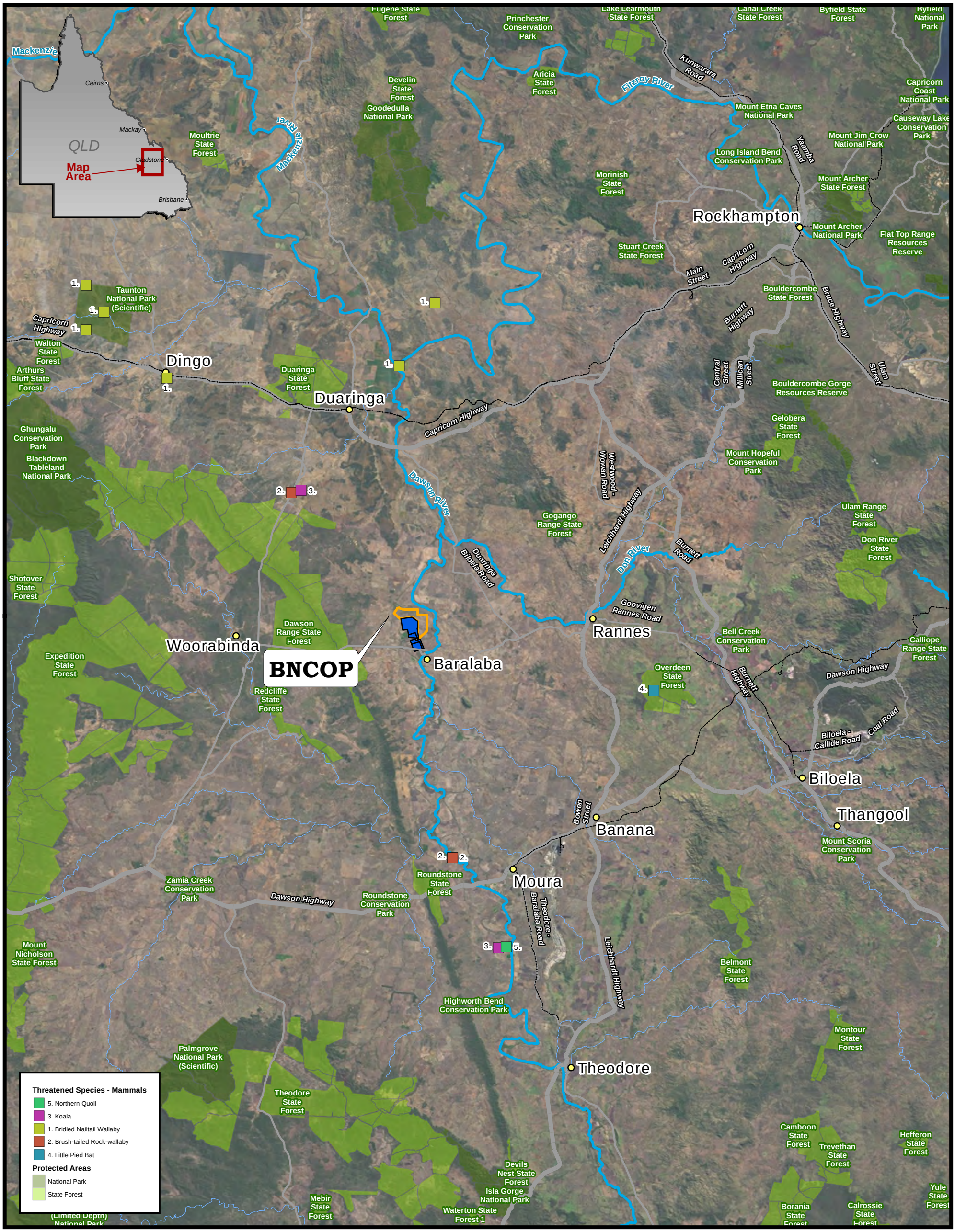

PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

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DATA SOURCES:
RASTER DATA:
ESRI, I-CUBED, USDA, USGS, AEX, GEOEYE, GETMAPPING, AEROGRID, IGN, IGP AND THE GIS USER COMMUNITY
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Legend
Populated Place.....
Road.....
Rail.....
Watercourse.....
Cockatoo Coal ML.....
BNCOP Additional Footprint...

TITLE

Figure 18
Significant Mammals
Landscape Distribution

REV	DESCRIPTION	DATE
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2	Update Data	26/02/14
3	Update Text	13/03/14

SCALE **1:750,000**
SIZE A3
DATUM GDA 94
PROJECTION

CURRENT ISSUE SIGNATURES

DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

Cockatoo Coal Limited

STATUS **FINAL**

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DRAWING NO BBN-098-08-03-140313

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5.4.1 Ornamental Snake (*Denisonia maculata*)

The Ornamental Snake is listed as 'Vulnerable' under the NC Act and EPBC Act. A perceived potential impact on this species was one reason why the BNCOP was declared a controlled action under the EPBC Act. As such a detailed evaluation of the potential impacts on this species is provided below.

Distribution

The Ornamental Snake occurs in scattered locations over a large area in Brigalow Belt North and South Bioregions and small portions of the Desert Uplands Bioregion and Central Coast Bioregion in Qld (Melzer, 2012; SEWPaC, 2011b). The occurrence of the Ornamental Snake within its overall distribution has been broadly modelled by SEWPaC (2011a), but more specifically modelled as part of the ACARP contemporary research on the Ornamental Snake (Footprints Environmental Consultants, 2011a) (an excerpt from the model for the landscape surrounding the BNCOP is provided on Figures 15a and 15b) (Section 3.2.2). Footprints Environmental Consultants (2011a) modelled the predicted distribution of the Ornamental Snake based on substrate and vegetation (Figure 15a) and then further refined the predicted distribution based on bioclimatic factors (lower temperature variability and rainfall) (Figure 15b). As the distribution of the Ornamental Snake depends not only upon habitat characteristics but also bioclimatic factors (Footprints Environmental Consultants, 2011a) the Combined Model Predicted Distribution of the Ornamental Snake shows the most likely predicted distribution of this species (Figure 15b). This figure shows a large expanse to the east of the Dawson River in which the snake is predicted to have a moderate likelihood of occurring.

Life History/Habitat

Within its distribution, the Ornamental Snake inhabits moist or seasonally moist areas within appropriate refuge habitat and aquatic or fringing vegetation with frog species forming their main prey (Cogger, 2014; Melzer, 2012). The Ornamental Snake is most likely to occur in Qld regional ecosystem Land Zone 4 (DotE, 2014c; Footprints Environmental Consultants, 2011a) and most likely in Brigalow-dominated ecosystems supporting gilgai - RE11.4.3 (DotE, 2014c), RE11.4.9 or RE11.4.8 (Footprints Environmental Consultants, 2011a). Other regional ecosystems where this species is recorded are RE11.4.6, RE11.3.3, RE11.5.16, RE11.3.1 (DotE, 2014c) and RE11.3.5, RE11.3.4, RE11.9.1, RE11.7.2, RE11.5.15 and RE11.4.11 (Footprints Environmental Consultants, 2011a).

The Ornamental Snake can also be found in cleared former occurrences of the above listed regional ecosystems with gilgai (melon-hole) mounds and depressions, and at margins of lake and wetlands (DotE, 2014c; Melzer, 2012). The Ornamental Snake can make use of seasonally moist areas and take refuge in soil cracks, ground litter and beneath vegetation for months at a time during the dry season (DotE, 2014c; Footprints Environmental Consultants, 2011a). This species is nocturnal.

A radio-tracking study by Footprints Environmental Consultants (2011a) based on four animals found that the species moves within Brigalow-gilgai habitat, is mainly restricted to this habitat type and did not move into adjacent habitats when the gilgai was dry or flooded. However sightings have been made of the species outside of Brigalow-gilgai habitat (DotE, 2014c) suggesting that they can move, albeit infrequently, into adjacent habitats. This is consistent with the snake's habit of being a relatively sedentary species (DotE, 2014c).

Presence of this Species and/or its Habitat in the BNCOP Locality

RPS Australia East (2014) undertook targeted surveys for the Ornamental Snake in accordance with relevant State and Commonwealth guidelines (Section 3.2.1; Attachment A). At the time the EPBC Act referral was lodged (24 October 2013), RPS Australia East had not completed the spring survey. The additional survey effort (including additional active searching) is described in Attachment A.

All areas of habitat likely to support the Ornamental Snake in the BNCOP Additional Footprint/Action Area were surveyed by RPS Australia East (2014) (Attachment A) and the survey timing proved suitable since the species was recorded on three occasions.

Records

The Ornamental Snake has not been recorded within the BNCOP Additional Footprint/Action Area, although it was recorded three times in two areas outside the BNCOP Additional Footprint/Action Area by RPS Australia East in April 2013 (Attachment A) (Figure 12). This species was recorded once within a pitfall trap in Riparian habitat (RE11.3.4) and twice within Brigalow Palustrine Wetland habitat (RE 11.4.8a) via active searches (Attachment A) (Figures 11 and 12).

As mentioned above, the Ornamental Snake is considered to be relatively sedentary (DotE, 2014c) and given the distance between the areas of known habitat (where the snake was recorded) and lack of well- connected and suitable potential habitat linking these two areas, there appears to be limited opportunity for movements of individuals between these two locations. It may be that a meta-population of Ornamental Snake has been artificially created through fragmentation of the patch of Brigalow Palustrine Wetland habitat to the west of the BNCOP.

There are 11 database records for the Ornamental Snake in the wider landscape, to the north, east and south of the BNCOP (Figure 16). The closest database records are approximately 25 km south-east (Queensland Museum, 2014) and approximately 25 km north-west of the BNCOP (Atlas of Living Australia, 2014).

Known Habitat

There is no known habitat for the Ornamental Snake in the BNCOP Additional Footprint/Action Area and not surprisingly the Ornamental Snake has not been recorded there.

Potential Habitat

Potential habitat for the Ornamental Snake in the BNCOP is outlined in Table 18 and mapped on Figure 14. The more likely potential habitat for the Ornamental Snake, based on an understanding of their ecology and habitat needs, is the Brigalow Woodland Habitat Type (Vegetation Community 1a) and Brigalow Palustrine Wetland Habitat Type (Vegetation Community 3a) which are in 'remnant' condition state.

As described in Section 4.4.1, the Disturbed Brigalow Woodland Habitat Type (Vegetation Communities 1b and 1c) and Disturbed Brigalow Palustrine Wetland Habitat Type (Vegetation Community 3b) have a simple structure consisting of Brigalow overstorey with no midstorey and a heavily grazed understorey with no obvious gilgai depressions. Hence an important habitat resource is absent that is required to sustain the snake (food and refuge habitat). Nevertheless, these currently deficient habitats for this species could provide habitat for the snake in the future under improved management (control of grazing, weeds and pests).

Table 18
Ornamental Snake Potential Habitat

	#	Vegetation Community	Condition State[1]	Approximate Area (ha) to be Cleared (Figure 14)	Patch Size Greater than 1 ha	Species Recorded in the Remnant Vegetation in the BNCOP?	Total Area Mapped by RPS Australia East (2014) (Attachment A) (Figure 14)
Brigalow Woodland	1a	RE11.3.1: Brigalow (*Acacia harpophylla*) ± Poplar Box (*Eucalyptus populnea*) Open Forest to Woodland[1]	Remnant	2.5	Yes	No	14
	1b	RE11.3.1: Brigalow (*A. harpophylla*) Disturbed Low Open Forest	Disturbed HVR	11	Yes	No	21
	1c	RE11.3.1: Brigalow (*A. harpophylla*) Low Open Forest	HVR	0.5	No	No	26
Brigalow Palustrine Wetland	2	RE11.4.8: Blackbutt (*E. cambageana*) and Brigalow (*A. harpophylla*) Open Forest to Woodland	Remnant	0	-	No	15
	3a	RE11.4.8a: Brigalow (*A. harpophylla*) Palustrine Wetland[1]	Remnant	2.5	Yes	No	20 (species recorded in a 4 ha patch)
	3b	RE11.4.8a Brigalow (*A. harpophylla*) Disturbed Palustrine Wetland[2]	HVR	12	Yes	No	45
Riparian	4a	RE11.3.3: Coolibah (*E. coolabah*) Open Forest to Woodland[3]	Remnant	0*	-	No	70
	4b	RE11.3.3: Coolibah (*E. coolabah*) Disturbed Open Forest to Woodland	Disturbed Remnant	0	-	No	107
	4c	RE11.3.3: Coolibah (*E. coolabah*) Low Open Forest to Woodland	HVR	0	-	No	15
	5	RE11.3.4: Queensland Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*Corymbia tesselaris*) Open Forest	Remnant	5	Yes	No	427 (species recorded in a 175 ha patch)
		Total	**-**	**33.5**	**-**	**-**	**760**

Note: Highlighted cells are vegetation communities within the BNCOP Additional Footprint/Action Area.

* These areas exclude the 'areas of exclusion of mining activities' shown on Figure 9 as well as the Coolibah-Black Box Woodland TEC in the BNCOP Operational Land, would be avoided and not cleared (Section 6.1).

[1] Condition State:

Remnant = Refer to definition in Section 4.2.

Disturbed Remnant = A more disturbed version of remnant vegetation.

HVR = High Value Regrowth (Refer to definition in Section 4.2.1).

Disturbed HVR = A more disturbed version of High Value Regrowth vegetation.

RPS Australia East (2014) (Attachment A) recognise Riparian Habitat as habitat for the Ornamental Snake (given the Ornamental Snake was recorded to the north of the BNCOP Operational Land in Riparian Habitat). However, despite the record the Commonwealth SPRAT Profile that states (DotE, 2014c): "*whilst the species shows a preference for moist areas, and there are records from riparian areas, the species' presumed preference for riparian habitat is questionable*" (Brigalow Belt Reptiles Workshop 2010).

The potential habitat for the Ornamental Snake shown on Figure 14 includes areas of cleared land with gilgai soils (approximately 240 ha within the BNCOP Additional Footprint and an additional 130 ha within the BNCOP Action Area). These areas provide limited habitat for the Ornamental Snake due to past clearance, ongoing grazing pressure, limited fallen timber and limited frog abundance. In relation to the gilgai soils within the approved Baralaba North/Wonbindi North Mine footprint, Footprints Environmental Consultants (Andrew Veary) (2011b) states:

> *Due to the highly disturbed nature of the area resulting from cattle grazing and previous clearing activities, including repetitive burning and inappropriate fire regimes, it is considered highly unlikely that these habitats would support rare and threatened species (e.g. Brigalow Scaly-foot [Paradelma orientalis], Yakka Skink [Egernia rugosa], Ornamental Snake [Denisonia maculata]).*

As described in Section 3.2.2, Andrew Veary contributed to the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a) and has undertaken the detailed study on the Ornamental Snake (Footprints Environmental Consultants, 2011a).

Important Habitat

DotE (2014b) states that "important populations [of the Ornamental Snake] occur in remnant vegetation on, or surrounding, gilgai mounds and depressions". The draft *Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a) define important habitat for the Ornamental Snake as:

- *Habitat where the species has been identified during a survey;*
- *Habitat near the limit of the species known range;*
- *Large patches of continuous, suitable habitat*[7] *and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or*
- *A habitat type where the species is identified during a survey, but which was previously thought not to support the species.*

Under this definition, areas of habitat where the Ornamental Snake was found outside of the BNCOP Additional Footprint/Action Area are important habitat for the Ornamental Snake (Figure 14). The draft *Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a) defines important habitat as a surrogate for important populations (i.e. under this definition, all Ornamental Snakes in their habitat would be part of important populations). Important populations are defined by DotE (2013a)[8]. The important habitat is on private land not owned or managed by CCL.

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[7] Suitable habitat for the Ornamental Snake is defined as *'open-forests to woodlands associated with gilgai formations and wetlands'* (SEWPaC, 2011).

[8] An 'important population' is defined as '*a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:*

- *key source populations either for breeding or dispersal*
- *populations that are necessary for maintaining genetic diversity, and/or*
- *populations that are near the limit of the species range'.*

The draft *Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a) describes that there is a low likelihood of a significant impact on the species if <1 ha of important habitat is to be cleared. No important habitat for the Ornamental Snake is located in the BNCOP Additional Footprint/Action Area or would be cleared (Figure 14). Despite this, further assessment is provided below as well as proposed impact mitigation and offset measures.

Critical Habitat

No habitat within the BNCOP locality has been identified as critical habitat for the Ornamental Snake in any recovery plans or listed on the EPBC Act *Register of Critical Habitat* maintained by the Minister of the Environment under the EPBC Act (DotE, 2014c).

The Ornamental Snake is not known to use the potential habitat in the BNCOP Additional Footprint/Action Area (for foraging, breeding or dispersal), despite targeted surveys in accordance with State and Commonwealth guidelines (Section 3.2.1; Attachment A). There is a possibly that the species could be present in low abundance however, were the Ornamental Snake to use the habitat in the BNCOP Additional Footprint/Action Area, the habitat is not likely to be critical to the survival of the species or necessary for the persistence or maintenance of the species given:

- the small extent of habitat in the BNCOP Additional Footprint/Action Area (with minimal carrying capacity) and the greater extent of habitat in the locality (Figures 14, 15a and 15b; Table 18) and subregions (Table 14);
- existing threatening processes have degraded the habitat in the BNCOP Additional Footprint/Action Area (the habitat is fragmented, grazed by livestock, prone to impacts by feral animals and weeds);
- the species is more widely distributed in the region and the BNCOP Additional Footprint/Action Area is not at a limit of the species range (there are database records in 11 locations within an 80 km radius);
- Land Zone 4, a habitat where the species is commonly recorded, may be relatively more important to the species in the region than Land Zone 3 (i.e. Land Zone 3 comprises most [55% or 18 ha] of the potential habitat in the BNCOP Additional Footprint/Action Area [RE11.3.1, RE11.3.3 and RE11.3.4 - Table 18]); and
- approximately 82% (12 ha) of the potential habitat on Land Zone 4 in the BNCOP Additional Footprint/Action Area is too degraded to potentially sustain the snake in its current form (Vegetation Community 3b has a simple structure with no midstorey and heavily grazed understorey [Table 18]).

The habitat where the Ornamental Snake was recorded is important habitat (by definition above), but it is also not likely to be critical to the survival of the species given:

- the species is more widely distributed in the region and the habitat is not at a limit of the species range;
- the greater extent of habitat in the locality (Figures 14, 15a and 15b; Table 18) and subregions (Table 14); and
- the patch to the west of the BNCOP is small and isolated from surrounding areas of potential habitat.

Likely Adverse Impacts on this Species

BNCOP would result in the following direct and indirect adverse impacts on the Ornamental Snake:

- Potential vegetated habitat for the Ornamental Snake (totalling approximately 33.5 ha) would be progressively cleared within the BNCOP Additional Footprint/Action Area (Table 18; Figure 9), including:
  - removal of seven patches of potential forest/woodland habitat (between 0.5 and 8 ha) in within the BNCOP Additional Footprint/Action Area;
  - reduction in the area of three patches of potential forest/woodland habitat which extend outside of the BNCOP Additional Footprint/Action Area; and
  - removal of gilgai soil in the BNCOP Additional Footprint/Action Area (the clearance of potential habitat would be permanent and gilgai depressions would not be recreated in rehabilitated mine landform).
- Potential localised indirect impacts on surrounding habitats (dust, noise, edge effects).

The Ornamental Snake has not been recorded in any of the potential habitat in the BNCOP Additional Footprint/Action Area, although it is possible that it could occur. The relatively sedentary nature of the Ornamental Snake also means that the snakes which occur in the known habitat are less likely to move through (or into) the area proposed to be cleared for the BNCOP.

In regard to indirect impacts, the patch of identified important habitat for the Ornamental Snake to the west of the BNCOP Operational Land (Figure 14) is closer to the approved Baralaba North/Wonbindi North Mine (approximately 0.6 km) than it would be to the BNCOP Additional Footprint/Action Area (approximately 2.2 km). Therefore, no additional indirect impacts on this patch are likely from the BNCOP.

The patch of identified important habitat for the Ornamental Snake to the north of the BNCOP Operational Land (Figure 14) would be 100 m from the proposed mining operations later in the mine life when the mining operations is closer to the northern wetland. There is a potential for localised indirect impacts on this habitats during operations (dust, noise, edge effects) but the susceptibility of the snake to these impacts is not certain (e.g. these impacts may or may not adversely impact the Ornamental Snake). This species is nocturnal so likely to be hidden during the day (Cogger, 2014) and the habitat is large enough for the species to move further away from the indirect impacts.

As described in Section 5.2.1, no adverse water-related impacts are likely to occur on habitats surrounding the BNCOP (e.g. Dawson River, Dawson River Anabranch or wetland to the north of the BNCOP Operational Land). This is because no measurable impacts on surface water quality are likely to occur from changes in surface water and no measurable impacts on surface water quantity or quality are likely to occur regardless of changes in captured catchment areas and groundwater (drawdown).

Other minor potential impacts on this species (e.g. feral animals, bushfire risk [DotE, 2014c]) are assessed in Sections 5.1 and 5.2.

The change in cumulative impact on the Ornamental Snake as a result of the BNCOP (considering impacts from other surrounding developments [Section 5.3]) is considered to be minimal. Habitat degradation from grazing livestock remains the most widespread threat to the species in the BNCOP locality and habitat patches where the Ornamental Snake was recorded (Figure 14) would be avoided by the BNCOP. This species was not recorded during fauna surveys in the closest mining developments (Sections 3.2.5 to 3.2.7).

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertaken by CCL to reduce potential adverse impacts on the Ornamental Snake:

- The proposed BNCOP pit was designed with a 100 m step-back from the wetland to the north of the BNCOP Operational Land, where the Ornamental Snake was found (Figure 12).
- Vegetation clearance procedures, including pre-clearance surveys to detect Ornamental Snakes within habitat proposed to be cleared. Ornamental Snakes encountered would be moved into adjoining habitat.
- A feral animal management strategy would be implemented to monitor and control feral animals (such as feral pigs) in the BNCOP Operational Land. Feral pigs can degrade habitat for the Ornamental Snake (after Melzer, 2012; DotE, 2014c).
- Weed management (prevention, monitoring and control) would be undertaken in the BNCOP Operational Land. It is noted that weed invasion is a factor that possibly influences the occurrence of the Ornamental Snake (after DotE, 2014c).
- Livestock would be selectively excluded from the mining lease for the life of the mine. The Ornamental Snake may benefit from the removal of livestock grazing as over-grazing is a recognised threat to Ornamental Snakes (after Melzer, 2012; DotE, 2014c).
- Bushfire prevention would be undertaken, noting that the Ornamental Snake occurs in Brigalow Woodland and uses groundcover which is susceptible to fire (after Melzer, 2012).
- Site water management would help avoid indirect impacts on Ornamental Snake habitat arising from alteration of hydrology or water quality (after DotE, 2014c).

A National or State recovery plan has not been prepared for this species. The above measures are predicted to be effective in reducing potential adverse impacts on the Ornamental Snake from the BNCOP because they are focused on addressing the recognised threats to the species and are consistent with the relevant threat abatement actions (e.g. avoiding habitat loss and reducing the risk of invasive and predatory species) (after DotE, 2014c). It is noted, however, that the known habitat for the Ornamental Snake is on private agricultural land not owned or managed by CCL.

An offset strategy is provided in Section 7. A key component of the offset strategy is to provide for the long-term protection and management of habitat for the Ornamental Snake.

EPBC Act Assessment

The Ornamental Snake is listed as 'Vulnerable' under the EPBC Act. Table 19 provides a more detailed assessment in accordance with DotE (2013a) *Significant Impact Guidelines 1.1: Matters of National Environmental Significance*.

Table 19
Likelihood of Significant Adverse Impacts on the Ornamental Snake - EPBC Act Assessment

Assessment Criteria[1]	Assessment	
Is the BNCOP likely to:		
Lead to a long-term decrease in the size of an important population of a species?	No	The patch of identified important habitat for the Ornamental Snake to the west of the BNCOP Operational Land (Figure 14) is closer to the approved Baralaba North/Wonbindi North Mine (approximately 0.6 km) than it would be to the BNCOP Additional Footprint/Action Area (approximately 2.2 km). Therefore, no addition indirect impacts on this patch are likely from the BNCOP. The proposed BNCOP mining operations would be 100 m from the patch of identified important habitat for the Ornamental Snake to the north of the BNCOP Operational Land (Figure 14) later in the mine life. There is a potential for localised indirect impacts on this habitat during operations (dust, noise, edge effects) but the susceptibility of the snake to these impacts is not certain (e.g. these impacts may or may not adversely impact the Ornamental Snake).
Reduce the area of occupancy of an important population?	Possible	Clearance of the potential habitat in the BNCOP Additional Footprint/Action Area may reduce the area of occupancy of the local population only if the snake uses the potential habitat in the BNCOP Additional Footprint/Action Area. However, the area of occupancy is not likely to be reduced based on targeted surveys for the species which was not found in the BNCOP Additional Footprint/Action Area (Attachment A), the potential habitat available (as discussed above) and the limited movement of the species (DotE, 2014c; Footprints Environmental Consultants, 2011a).
Fragment an existing important population into two or more populations?	No	The BNCOP Additional Footprint/Action Area is not likely to fragment an existing important population into two or more populations due to the location of the existing important populations and the current level of fragmentation (and cleared land between the areas) (Figure 14).
Adversely affect habitat critical to the survival of a species?	No	The BNCOP Additional Footprint/Action Area is not likely to adversely affect habitat critical to the survival of a species (refer to discussion above this table).
Disrupt the breeding cycle of an important population?	No	BNCOP Additional Footprint/Action Area is not likely to disrupt the breeding cycle of an important population given there is no evidence to suggest that the Ornamental Snake breeds within the potential habitat in the BNCOP Additional Footprint/Action Area.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	No	The potential habitat in the BNCOP Additional Footprint/Action Area is not likely to cause the species to decline. The potential habitat in the BNCOP Additional Footprint/Action Area is relatively small (with minimal carrying capacity) compared to the greater extent of habitat in the locality (Figures 14, 15a and 15b; Table 18) and subregion (Table 14). Existing threatening processes have degraded the habitat in the BNCOP Additional Footprint/Action Area (the habitat is fragmented, grazed by livestock, prone to feral animals and weeds).
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	No	Feral pigs can degrade habitat for the Ornamental Snake (after Melzer, 2012; DotE, 2014c). A feral animal management strategy would be implemented to monitor and control feral animals (such as feral pigs).
Introduce disease that may cause the species to decline?	No	The BNCOP does not include activities that would result in a disease that may cause the species to decline.
Interfere substantially with the recovery of the species?	No	The BNCOP would not interfere substantially with the recovery of the species for the reasons outlined above and because the potential habitat to be cleared is marginal potential habitat.

[1] As defined by the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DotE, 2013a).

Outcome

The Ornamental Snake is known to occur in habitats outside of the BNCOP Additional Footprint. Recent radio-tracking studies (Footprints Environmental Consultants, 2011a) have shown the snake is relatively sedentary. The cleared land between the known habitat outside and the potential habitat inside the BNCOP Additional Footprint is likely to impede the snake's movement and reduce the likelihood that the BNCOP would impact the extant populations within those patches.

5.4.2 Black-necked Stork (*Ephippiorhynchus asiaticus*)

The Black-necked Stork is listed as 'Near Threatened' under the NC Act.

Distribution

The Black-necked Stork is distributed mainly in the coastal and near-coastal areas of northern and eastern Australia, and has been recorded throughout most of Qld (Morcombe, 2004).

Habitat

The Black-necked Stork inhabits a range of habitats, but mostly shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation (Morcombe, 2004). This species also is known, from time to time, to inhabit swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters (Morcombe, 2004). This species is highly mobile.

Presence of this Species and/or its Habitat in the BNCOP Locality

The Black-necked Stork was recorded flying over the BNCOP Additional Footprint by RPS Australia East in April and October 2013 (Attachment A) (Figure 12). This species could potentially use the wetlands (Figure 7) and Riparian Woodland Habitat (Figure 11) in the landscape.

This species was recorded during surveys for the Ensham Central Project, approximately 150 km north-east of the BNCOP and Springsure Creek Coal Project, approximately 160 km west of the BNCOP (Section 3.2.5).

Likely Adverse Impacts on this Species

Most of the potential habitat for the Black-necked Stork in the BNCOP locality (Riparian Woodland Habitat [Figure 11] and wetlands [Figure 7]) occurs outside of the BNCOP Additional Footprint. Approximately 5 ha of Riparian Woodland Habitat [Figure 11] and 1 ha of a farm dam (lucustrine wetland) (Figure 7) would be removed in the BNCOP Additional Footprint. Adverse impacts on this species (and its habitat) are likely to be minimal, if any.

As described in Section 5.2.1, no adverse water-related impacts are likely to occur on habitats surrounding the BNCOP (e.g. Dawson River, Dawson River Anabranch or wetland to the north of the BNCOP Operational Land). This is because no measurable impacts on surface water quality are likely to occur from changes in surface water and no measurable impacts on surface water quantity or quality are likely to occur regardless of changes in captured catchment areas and groundwater (drawdown).

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertake to reduce potential adverse impacts on the Black-necked Stork (were it to use habitat in the BNCOP Additional Footprint or surrounds):

- Impact avoidance measures outlined in the table in Section 6.1 (since this species could potentially use the features listed in the table in Section 6.1).
- A feral animal management strategy would be implemented to monitor and control feral animals in the BNCOP Operational Land which may present a threat to this species.

Outcome

The Black-necked Stork was recorded flying over the BNCOP Additional Footprint. Adverse impacts on this species (and its habitat) are likely to be minimal, if any, given most of the potential habitat for the Black-necked Stork in the BNCOP locality occurs outside of the BNCOP Additional Footprint.

5.4.3 Cotton Pygmy-goose (*Nettapus coromandelianus*)

The Cotton Pygmy-goose is listed as 'Near Threatened' under the NC Act.

Distribution

The Cotton Pygmy-goose is distributed along most of the coastal and near-coastal areas of Qld and occurs as a vagrant in NSW.

Habitat

The Cotton Pygmy-goose prefers deep permanent pools and swamps but moves into more ephemeral habitats during the wet season (Morcombe, 2004). This species is considered to be almost exclusively aquatic (Morcombe, 2004). This species is highly mobile.

Presence of this Species and/or its Habitat in the BNCOP Locality

The Cotton Pygmy-goose was recorded by RPS Australia East in April 2013 at two locations within the BNCOP Additional Footprint (Figure 12), once at a farm dam and once in the Eucalypt Open Forest Habitat (which is rare for this species [after Morcombe, 2004]).

This species was recorded during surveys for the Minyango Central Project, approximately 70 km north-west of the BNCOP and Ensham Central Project, approximately 150 km north-west of the BNCOP (Sections 3.2.5 and 3.2.6).

Likely Adverse Impacts on this Species

Most of the potential habitat for the Cotton Pygmy-goose in the BNCOP locality (Riparian Habitat [Figure 11] and wetlands [Figure 7]) occurs outside of the BNCOP Additional Footprint. Adverse impacts on this species are likely to be minimal, if any.

The farm dam (where the species was observed on one occasion) is in the BNCOP Additional Footprint and would be removed for the BNCOP (approximately 1 ha). Natural potential habitat for the Cotton Pygmy-goose in the BNCOP Additional Footprint is represented by approximately 5 ha of Riparian Woodland Habitat, though surrounding habitats (such as the Eucalypt Open Forest) may be visited in frequently.

As described in Section 5.2.1, no adverse water-related impacts are likely to occur on habitats surrounding the BNCOP (e.g. Dawson River, Dawson River Anabranch or wetland to the north of the BNCOP Operational Land). This is because no measurable impacts on surface water quality are likely to occur from changes in surface water and no measurable impacts on surface water quantity or quality are likely to occur regardless of changes in captured catchment areas and groundwater (drawdown).

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertaken to reduce potential adverse impacts on the Cotton Pygmy-goose:

- Impact avoidance measures outlined in the table in Section 6.1 (since this species could potentially use the features listed in the table in Section 6.1).
- A feral animal management strategy would be implemented to monitor and control feral animals in the BNCOP Operational Land which may present a threat to this species.

Outcome

Adverse impacts on the Cotton Pygmy-goose (and its habitat) are likely to be minimal, if any, given the species preferred habitat (deep permanent pools and swamps) occur outside of the BNCOP Additional Footprint. The loss of the farm dam (where the species was observed on one occasion) is not likely to adversely impact the species.

5.4.4 Squatter Pigeon (southern) (*Geophaps scripta scripta*)

The Squatter Pigeon (southern) is listed as 'Vulnerable' under the NC Act and EPBC Act.

Distribution

The Squatter Pigeon (southern) has a known distribution extending from the Burdekin-Lynd divide in Central Qld, west to Barcaldine, Longreach and Charleville, east to the coastline between Townsville and Port Curtis (near Gladstone), south to scattered sites throughout south-eastern Qld and the Border Rivers region of northern NSW (DotE, 2014c; Reis, 2012). The species does not appear to be undergoing a population decline (Garnett *et al.* 2010; Reis, 2012). The Squatter Pigeon (southern) is locally nomadic or sedentary (Reis, 2012).

Life History/Habitat

Natural foraging habitat for the Squatter Pigeon (southern) comprises any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species, on sandy or gravelly soils, within 3 km of a suitable, permanent or seasonal waterbody (Squatter Pigeon Workshop, 2011).

This species feeds and nests on the ground but roosts in trees. The Squatter Pigeon (southern) withstands habitats with some grazing pressure but is more common in habitat without grazing and no longer occurs in areas with intense grazing (Reis, 2012).

Breeding generally occurs on stony rises with sandy or gravelly soils, within 1 km of a suitable, permanent waterbody (Squatter Pigeon Workshop, 2011). Nests are shallow depressions lined with grass and usually sheltered (Reis, 2012).

Presence of this Species and/or its Habitat in the BNCOP Locality

RPS Australia East undertook targeted surveys for the Squatter Pigeon (southern) in accordance with relevant State and Commonwealth guidelines (Section 3.2.1; Attachment A).

Records

The Squatter Pigeon (southern) has been recorded throughout the BNCOP Additional Footprint/Action Area and surrounding locality (on multiple occasions) (Attachment A; Footprints Environmental Consultants, 2012) (Figure 12). The Squatter Pigeon (southern) was recorded in a number of different habitat types including Riparian, Disturbed Brigalow Palustrine Wetland, Eucalypt Open Forest and cleared grazing paddocks (Attachment A).

There are numerous records of the species within an 80 km radius of the BNCOP (Figure 17).

Known Habitat

The Squatter Pigeon (southern) uses a variety of habitat types. This species has been recorded in all native habitat types in the BNCOP Additional Footprint/BNCOP Action Area (277 ha) and may potentially use the cleared grazing paddocks (approximately 1,164 ha in the BNCOP Additional Footprint and approximately 1,318 ha in the BNCOP Action Area).

Essential Habitat

As discussed in Section 4.4.5, approximately 24.96 ha of essential habitat for the Squatter Pigeon has been mapped by DNRM (2013; 2014) within the BNCOP Additional Footprint and to the north of the BNCOP Additional Footprint (Figure 13). There is a further 472 ha of essential habitat for the Squatter Pigeon mapped in the wider area (Figure 13).

Important Habitat and Critical Habitat

No habitat within the BNCOP locality has been identified as important or critical habitat for the Squatter Pigeon (southern) in any recovery plans or listed on the EPBC Act *Register of Critical Habitat* maintained by the Minister of the Environment under the EPBC Act (DotE, 2014c). Further, Garnett *et al.* (2010) and Reis (2012) describe that the species does not appear to be undergoing a current decline in population.

The habitat in the BNCOP Additional Footprint/Action Area for the Squatter Pigeon (southern) is not deemed to meet the definition of 'important habitat' or 'critical habitat' under the EPBC Act due to the heavily fragmented nature of the habitat which is more widespread in the wider landscape. The BNCOP is not at a limit of the species range and the population of Squatter Pigeon (southern) in the BNCOP locality is likely to occur more widely in the Dawson River catchment given the extent of database records and habitat (Figures 13 and 17).

Likely Adverse Impacts on this Species

The Squatter Pigeon (southern) shows resilience due to its persistence in the already highly cleared and fragmented landscape. BNCOP would result in the following direct and indirect adverse impacts on the Squatter Pigeon (southern):

- Known habitat for the Squatter Pigeon (southern) (totalling approximately 277 ha woodland/forest habitat and approximately 1,164 ha of cleared grazing paddocks in the BNCOP Additional Footprint [and approximately 1,318 ha in the BNCOP Action Area]) would be progressively cleared (Figure 11), including:
  - removal of patches of potential habitat in within the BNCOP Additional Footprint/Action Area; and
  - reduction in the area of three patches of potential habitat which extend outside of the BNCOP Additional Footprint/Action Area.
- Potential localised indirect impacts on surrounding habitats (dust, noise, edge effects).

As described in Section 5.2.1, no adverse water-related impacts are likely to occur on habitats surrounding the BNCOP (e.g. Dawson River, Dawson River Anabranch or wetland to the north of the BNCOP Operational Land). This is because no measurable impacts on surface water quality are likely to occur from changes in surface water and no measurable impacts on surface water quantity or quality are likely to occur regardless of changes in captured catchment areas and groundwater (drawdown).

Other minor potential impacts on this species (e.g. feral animals, bushfire risk [DotE, 2014c]) are assessed in Sections 5.1 and 5.2.

The change in cumulative impact on the Squatter Pigeon (southern) as a result of the BNCOP (considering impacts from other surrounding developments [Section 5.3]) is considered to be minimal because of the localised nature of the BNCOP. This species was recorded during surveys for the Minyango Central Project, approximately 70 km north-west of the BNCOP (Section 3.2.5).

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertaken by CCL to reduce potential adverse impacts on the Squatter Pigeon (southern):

- Impact avoidance measures outlined in the table in Section 6.1 (since the Squatter Pigeon [southern] was recorded across a variety of habitats including those outlined in the table in Section 6.1).
- Vegetation clearance procedures, including clearing potential habitat for the Squatter Pigeon outside of its breeding period (July to May), where practicable.
- A feral animal management strategy would be implemented to monitor and control feral animals (such as the European Rabbit, Feral Cat and European Red Fox) in the BNCOP Operational Land.
- Livestock would be selectively excluded from the mining lease for the life of the mine.
- Rehabilitation using native species typical of the surrounding area.

The above measures are predicted to be effective in reducing potential adverse impacts on the Squatter Pigeon (southern) from the BNCOP because they are focused on addressing the recognised threats to the species and are consistent with the relevant threat abatement actions (e.g. avoiding habitat loss and controlling predators and herbivores) (after DotE, 2014c). A National or State recovery plan has not been prepared for this species.

An offset strategy is provided in Section 7. A key component of the offset strategy is to provide for the long-term protection and management of habitat for the Squatter Pigeon (southern).

EPBC Act Assessment

The Squatter Pigeon (southern) is listed as 'Vulnerable' under the EPBC Act. Table 20 provides a more detailed assessment in accordance with DotE (2013a) *Significant Impact Guidelines 1.1: Matters of National Environmental Significance*.

Table 20
Likelihood of Significant Adverse Impacts on the Squatter Pigeon (southern) - EPBC Act Assessment

Assessment Criteria[1]	**Assessment**	
Is the BNCOP likely to:		
Lead to a long-term decrease in the size of an important population of a species?	No	The Squatter Pigeon (southern) (*Geophaps scripta scripta*) is commonly recorded in fragmented landscapes in the Brigalow Belt South Bioregion. The population of Squatter Pigeon (southern) in the BNCOP locality is likely to occur more widely in the Dawson River catchment given the extent of database records and habitat in that catchment (Figures 13 and 17).
Reduce the area of occupancy of an important population?	No	The BNCOP would reduce the area of occupancy of the species (the species would no longer occupy the land within the BNCOP Additional Footprint/Action Area), however the BNCOP would not reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations?	No	The BNCOP is unlikely to fragment an existing important population into two or more populations given the Squatter Pigeon (southern) is highly mobile and able to access any habitat surrounding the BNCOP Additional Footprint/Action Area.
Adversely affect habitat critical to the survival of a species?	No	The habitat in the BNCOP Additional Footprint/Action Area for the Squatter Pigeon (southern) is not deemed to meet the definition of 'critical habitat' under the EPBC Act due to the heavily fragmented nature of the habitat which is more widespread in the wider landscape.
Disrupt the breeding cycle of an important population?	No	The BNCOP is unlikely to disrupt the breeding cycle of the Squatter Pigeon (southern) given the species has been recorded in many surrounding habitats that occur more extensively outside of the BNCOP Additional Footprint/Action Area (Figure 11).
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	No	The BNCOP is not likely to cause the species to decline because habitat resources for the Squatter Pigeon (southern) (e.g. drinking sources, remnant and regrowth vegetation for foraging/roosting and nesting habitat) would remain outside of the BNCOP Additional Footprint, such that the species is likely to persist in the landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	No	This species is under threat from predation by cats and foxes (Reis, 2012). A feral animal management strategy would be implemented to monitor and control feral animals (such as the European Rabbit, Feral Cat and European Red Fox).
Introduce disease that may cause the species to decline?	No	The BNCOP does not include activities that would result in a disease that may cause the species to decline.
Interfere substantially with the recovery of the species?	No	The BNCOP would not interfere substantially with the recovery of the species because habitat resources for the Squatter Pigeon (southern) (e.g. drinking sources, remnant and regrowth vegetation for foraging/roosting and nesting habitat) would remain outside of the BNCOP Additional Footprint, such that the species is likely to persist in the landscape.

[1] As defined by the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DotE, 2013a).

Outcome

The Squatter Pigeon (southern) is commonly recorded in fragmented landscapes in the Brigalow Belt South Bioregion. Habitat resources for the Squatter Pigeon (southern) (e.g. drinking sources, remnant and regrowth vegetation for foraging/roosting and nesting habitat) would remain outside of the BNCOP Additional Footprint, such that the species is likely to persist in the landscape.

5.4.5 Short-beaked Echidna (*Tachyglossus aculeatus*)

In Qld, the Short-beaked Echidna is listed as 'Special Least Concern' under the NC Act. 'Special Least Concern' fauna species listed under the NC Act are species that are common or abundant and likely to survive in the wild but have special cultural significance.

Habitat

The Short-beaked Echidna is a common iconic species that has been recorded across Australia. The Short-beaked Echidna feeds on ants and termites in a variety of habitat types, such as forests, woodlands, heath and grasslands (Van Dyck and Strahan, 2008; Australian Museum, 2014).

This species is commonly recorded during surveys in the region (e.g. surveys undertaken for other mining developments [Sections 3.2.3, 3.2.6 and 3.2.7]).

Presence of this Species and/or its Habitat in the BNCOP Locality

Two Short-beaked Echidnas were recorded by RPS Australia East in October 2013 outside of the BNCOP Additional Footprint (Figure 12) (Attachment A). Footprints Environmental Consultants (2011b) also previously recorded Short-beaked Echidna in the BNCOP locality. The Short-beaked Echidna uses a variety of habitat types and it may potentially occur in the BNCOP Additional Footprint.

Likely Adverse Impacts on this Species

Individual Short-beaked Echidna may be adversely impacted during land clearance for the BNCOP (277 ha). The loss of habitat for the species in the BNCOP Additional Footprint is not likely to adversely impact the species as the Short-beaked Echidna and its habitat occurs more widely and the species is very mobile.

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertaken by CCL to reduce potential adverse impacts on Short-beaked Echidna:

- Impact avoidance measures outlined in the table in Section 6.1 (since the Short-beaked Echidna could potential occur across a variety of habitats including those outlined in the table in Section 6.1).
- Vegetation clearance procedures, including pre-clearance surveys to detect animals (such as the Short-beaked Echidna) within habitat proposed to be cleared and managing clearing works to minimise injury to the fauna detected.
- Rehabilitation using native species typical of the surrounding area.

Outcome

The Short-beaked Echidna uses a variety of habitat types and it may potentially occur in the BNCOP Additional Footprint and wider locality. The impacts on this species are likely to be minimal.

5.4.6 Little Pied Bat (*Chalinolobus dwyeri*)

The Little Pied Bat is listed as 'Near Threatened' under the NC Act.

Habitat

The Little-Pied Bat is found in inland Qld and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria (NSW Office of Environment and Heritage [OEH], 2014). It generally occurs in the semi-arid interior regions of east Australia to west of the Great Dividing Range (Churchill, 2008).

The Little Pied Bat inhabits dry open forest, open woodland, Mulga woodlands, chenopod shrublands, Callitris forest and Casuarina pauper woodlands (Churchill, 2008). This species roosts in trees, caves, abandoned mines and buildings (Churchill, 2008).

The Little Pied Bat feeds on moths and possibly other flying invertebrates (OEH, 2014). In arid or semi-arid environments, the Little Pied Bat forages on insects and may occur near permanent or semi-permanent water (Duncan *et al*., 1999). Flexibility in foraging habitat is also known as this species is distributed in open areas in semi-arid and arid zones.

Radio-tracked bats in north-western NSW were found to make nightly return trips of 12 to 34 km between their roost sites to a creek with small pools of water where they were active throughout the night (Van Dyck and Strahan, 2008).

Presence of this Species and/or its Habitat in the BNCOP locality

Calls of the Little Pied Bat have been recorded throughout the BNCOP Additional Footprint and surrounding locality (on multiple occasions) during recent fauna surveys by RPS Australia East in April and October 2013 (Figure 12) (Attachment A). A Little Pied Bat was also caught in a harp trap at one location by RPS Australia East in April 2013.

This species was recorded during surveys for the Minyango Central Project, approximately 70 km north-west of the BNCOP and Springsure Creek Coal Project, approximately 160 km west of the BNCOP (Sections 3.2.5 and 3.2.7).

Likely Adverse Impacts on this Species

Most of the broad fauna habitat types that would be cleared by the BNCOP provide potential foraging habitat resources for the Little-Pied Bat (moths and possibly other flying invertebrates). The potential foraging habitat proposed to be removed is a small component of the species potential foraging habitat in the region for this species.

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertaken by CCL to reduce potential adverse impacts on the Little Pied Bat:

- Impact avoidance measures outlined in the table in Section 6.1 (since Little Pied Bats were recorded across a variety of habitats including those outlined in the table in Section 6.1).
- Vegetation clearance procedures, including pre-clearance surveys to detect bats within habitat proposed to be cleared and/or felling trees using a method that minimises impacts to hollow-dwelling animals (which may include the Little Pied Bat).
- Rehabilitation using native vegetation species typical of the surrounding area.

Outcome

The Little Pied Bat is known to use habitat in the BNCOP Additional Footprint and surrounding locality.

5.4.7 South-eastern Long-eared Bat (*Nyctophilus corbeni*)

The South-eastern Long-eared Bat is listed as 'Vulnerable' under the NC Act and EPBC Act. Until recently, the South-eastern Longed-eared Bat was considered to be a subspecies of the Greater Long-eared Bat, *Nyctophilus timoriensis* (Duncan *et al,* 1999; Parnaby, 2009).

Distribution

In Qld, the South-eastern Long-eared Bat is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park and has been recorded as far north as the Expedition Range and Dawson River areas (DotE, 2014c; DEHP, 2014g). The South-eastern Long-eared Bat also occurs within the Murray-Darling Basin in south-eastern Australia, NSW and Victoria (DotE, 2014c).

Life History/Habitat

The South-eastern Long-eared Bat occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands. The species also occurs in Buloke woodland, Brigalow woodland, Belah woodland, Smooth-barked Apple, *Angophora leiocarpa*, woodland; River Red Gum, *Eucalyptus camaldulensis*, forests lining watercourses and lakes, Black Box, *Eucalyptus largiflorens*, woodland, and dry sclerophyll forest (DotE, 2014c). Individuals used a number of different roost sites in the same night (Schulz and Lumsden 2010 in DotE, 2014c).

The South-eastern Long-eared Bat is an insectivorous and voracious feeder. Food can be taken in flight, by gleaning vegetation or ground foraging (DotE, 2014c). In flight, it commonly feeds on beetles, bugs, and moths (DotE, 2014c) however it has also been recorded feeding on grasshoppers and crickets. The South-eastern Long-eared Bat has a wide home range and forages a few kilometres away from roost sites (DotE, 2014c).

Presence of this Species and/or its Habitat in the BNCOP Locality

Records

The calls of *Nyctophilus corbeni* recorded with an Anabat detector cannot be distinguished from calls of other *Nyctophilus* sp. that are also potentially present in the area. Calls of *Nyctophilus* sp. were recorded by RPS Australia East in April and October 2013 throughout the BNCOP Additional Footprint/Action Area and surrounding locality (Attachment A).

RPS Australia East (2014) (Attachment A) describe that the calls are more likely to be from a common long-eared bat species since the common long-eared bat species were caught in harp traps and the closest record of the South-eastern Long-eared Bat is approximately 130 km to the north-east of the BNCOP Additional Footprint/Action Area (Figure 18). However, it remains a possibility that the South-eastern Long-eared Bat is present (and some of the calls may be of the South-eastern Long-eared Bat).

Known Habitat

If the South-eastern Long-eared Bat is present in the area, foraging habitat would be removed through clearance of woodland/forest (277 ha) and some breeding where there are hollow-bearing trees.

Important Habitat and Critical Habitat

No habitat within the BNCOP locality has been identified as important or critical habitat for the South-eastern Long-eared Bat in any recovery plans or listed on the EPBC Act *Register of Critical Habitat* maintained by the Minister of the Environment under the EPBC Act (DotE, 2014c).

Likely Adverse Impacts on this Species

As described above, if the South-eastern Long-eared Bat is present in the area, foraging habitat would be removed through clearance of woodland/forest (277 ha) and some breeding where there are hollow-bearing trees. Past disturbance and clearance has resulted in reduced abundance of tree hollows across the BNCOP Additional Footprint/Action Area and regrowth vegetation is common. Hollow-bearing trees are more abundant outside of the BNCOP Additional Footprint/Action Area along the Dawson River and Dawson River Anabranch as the vegetation is typically older.

The habitat in the BNCOP Additional Footprint/Action Area may also be suboptimal for the South-eastern Long-eared Bat due to the high levels of fragmentation. Habitat fragmentation is considered a potential threat to the South-eastern Long-eared Bat because the species displays a preference for larger areas of intact habitat (DotE, 2014c).

Other minor potential impacts on this species (e.g. feral animals, bushfire risk [DotE, 2014c]) are assessed in Sections 5.1 and 5.2.

The change in cumulative impact on the South-eastern Long-eared Bat as a result of the BNCOP (considering impacts from other surrounding developments) is considered to be minimal. The native vegetation communities/regional ecosystems to be cleared (i.e. the foraging and breeding habitat) are all more widely occurring in the surrounding landscapes and subregions (after Accad *et al.,* 2013) (Table 14). It should also be noted that this species habitat is not limited to the vegetation communities/regional ecosystems in the BNCOP Additional Footprint/Action Area. This species was not recorded during fauna surveys of other mining developments that are relatively near (Sections 3.2.5 to 3.2.7).

Impact Avoidance and Mitigation Measures

As described in Section 6, the following measures would be undertaken by CCL to reduce potential adverse impacts on Long-eared Bats (including the South-eastern Long-eared Bat were it to occur):

- Impact avoidance measures outlined in the table in Section 6.1 (since Long-eared Bats were recorded across a variety of habitats).
- Vegetation clearance procedures, including pre-clearance surveys to detect bats within habitat proposed to be cleared and/or felling trees using a method that minimises impacts to hollow-dwelling animals.
- Bushfire prevention would be undertaken, noting that fire can reduce hollow-bearing trees in which Long-eared Bats roost.
- Rehabilitation using native species typical of the surrounding area.

The above measures are predicted to be effective in reducing potential adverse impacts from the BNCOP on the South-eastern Long-eared Bat (were it to occur) because they are focused on addressing the recognised threats to the species and are consistent with the relevant threat abatement actions (e.g. avoiding habitat loss) (after DotE, 2014c). The *draft National Recovery Plan for the South-eastern Long-eared Bat* (Schulz and Lumsden, 2010) has not been released.

An offset strategy is provided in Section 7. A key component of the offset strategy is to provide for the long-term protection and management of habitat for the South-eastern Long-eared Bat.

EPBC Act Assessment

The South-eastern Long-eared Bat is listed as 'Vulnerable' under the EPBC Act. Table 21 provides a more detailed assessment in accordance with DotE (2013a) *Significant Impact Guidelines 1.1: Matters of National Environmental Significance*.

Table 21
Likelihood of Significant Adverse Impacts on the South-eastern Long-eared Bat - EPBC Act Assessment

Assessment Criteria[1]	**Assessment**	
Is the BNCOP likely to:		
Lead to a long-term decrease in the size of an important population of a species?	No	If the South-eastern Long-eared Bat is present in the area, the BNCOP is unlikely to lead to a long-term decrease in the size of the population given the population is more widespread in the region as is potential habitat for the species (after Accad *et al.,* 2013) (Table 14).
Reduce the area of occupancy of an important population?	No	If the South-eastern Long-eared Bat occupies the habitat in the BNCOP Additional Footprint/Action Area (for foraging or breeding), the BNCOP may reduce the area of occupancy of individuals.
Fragment an existing important population into two or more populations?	No	Habitat fragmentation is considered a potential threat to the South-eastern Long-eared Bat because the species displays a preference for larger areas of intact habitat (DotE, 2014c). However, the BNCOP would not fragment a population of South-eastern Long-eared, were it to occur in the BNCOP locality, as the population is widespread in the region.
Adversely affect habitat critical to the survival of a species?	No	The habitat in the BNCOP is not critical to the survival of the species.
Disrupt the breeding cycle of an important population?	No	The BNCOP may disrupt breeding of individuals of the species if the South-eastern Long-eared Bat in the BNCOP Additional Footprint/Action Area was present. However, past disturbance and clearance has resulted in reduced abundance of tree hollows across the BNCOP Additional Footprint/Action Area.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	No	The native vegetation communities/regional ecosystems to be cleared (i.e. the foraging and breeding habitat) are all more widely occurring in the landscape and subregions (after Accad *et al.,* 2013) (Table 14).It should be noted that this species' habitat is not limited to the vegetation communities/regional ecosystems in the BNCOP Additional Footprint/Action Area.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	No	The impact of feral predation on the South-eastern Long-eared Bat is unknown (DotE, 2014c). However, a feral animal management strategy would be implemented to monitor and control feral animals (such as the European Rabbit, Feral Cat and European Red Fox).
Introduce disease that may cause the species to decline?	No	The BNCOP does not include activities that would likely result in a disease that may cause the species to decline.
Interfere substantially with the recovery of the species?	No	The BNCOP would not interfere substantially with the recovery of the species because the habitat to be cleared is a small component of the species habitat in the landscape and subregions (after Accad *et al.,* 2013) (Table 14). Potential adverse impacts on this species would be further reduced with rehabilitation of the post-mine landforms (with native species typical of the surrounding area) and an offset strategy that provides for the long-term protection and management of habitat for the South-eastern Long-eared Bat.

[1] As defined by the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DotE, 2013a).

Outcome

If the South-eastern Long-eared Bat is present in the area, foraging habitat would be removed through clearance of woodland/forest and some breeding could be potentially impacted where there are hollow-bearing trees. These resources are not limited to the BNCOP Additional Footprint/Action Area. Hollow-bearing trees are more abundant outside of the BNCOP Additional Footprint/Action Area along the Dawson River and Dawson River Anabranch as there the forest vegetation is typically older.

5.4.8 Other Conservation Significant Species

Potential adverse impacts on conservation significant fauna species listed in Table 17 (i.e. the Collared Delma, Yakka Skink, Brigalow Scaly-foot, Black-chinned Honeyeater and Koala) have been assessed in Table 22. RPS Australia East (2014) undertook targeted surveys for these species in accordance with relevant State and Commonwealth guidelines (Section 3.2.1; Attachment A). None of these species were found, but they are considered here due to the potential for the species to be present in the BNCOP Additional Footprint and/or adjacent habitats (irrespective of whether the species were detected during targeted surveys).

The Collared Delma, Yakka Skink and Koala are listed as 'Vulnerable' under the EPBC Act. In accordance with DotE (2013a) *Significant Impact Guidelines 1.1: Matters of National Environmental Significance*, the BNCOP is unlikely to significantly impact these species as it is unlikely to:

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

Table 22
Assessments for Conservation Significant Fauna Species that are not Known or Considered Likely to Occur in the BNCOP Additional Footprint

Species	Conservation Status[1]		Assessment
	NC Act	EPBC Act	
Reptiles			
Collared Delma (*Delma torquata*)	V	V	***Distribution*** The Collared Delma occurs in south-east Qld. The Blackdown Tableland National Park (Figure 1) is the northern limit of the species range (DotE, 2014c). ***Life History/Habitat*** The Collared Delma inhabits open-forests, woodlands and adjacent exposed rocky areas in Qld RE Land Zones 3, 9 and 10 and requires a well developed microhabitat of rocks, logs, bark, coarse woody debris and/or leaf litter (DotE, 2014c; SEWPaC, 2011a). The Collared Delma feeds on insects and spiders (DotE, 2014c). The home range and movement of the Collared Delma is largely unknown (DotE, 2014c). ***Presence of this Species and/or its Habitat in the BNCOP Locality*** The Collared Delma has not been recorded in the BNCOP Additional Footprint/Action Area and there are no database records of this species within an 80 km radius around the BNCOP. Approximately 82 ha of potential habitat for the species occurs within the BNCOP Additional Footprint (e.g. eucalypt-dominated woodlands and open-forests on Land Zone 3 [DotE, 2014c]). A portion of this habitat (approximately 74.5 ha or 90%) is lacking microhabitat suitable to support the species (Attachment A). Another portion (approximately 2.5 ha or 3%) is highly fragmented and fragmentation is a threat to this species (DotE, 2014c). ***Likely Adverse Impacts on this Species*** The BNCOP would remove approximately 82 ha of potential habitat for this species (represented by RE11.3.1, RE11.3.4 and RE11.3.2) of which approximately 7.5 ha provides suitable microhabitat for the species (remnant RE11.3.1 and RE11.3.4). However, the BNCOP is not likely to significantly adversely impact this species given the absence of records in or near the BNCOP area and sub-optimal nature of the potential habitat (approximately 77 ha or 93%).
Yakka Skink (*Egernia rugosa*)	V	V	***Distribution*** The Yakka Skink has a relatively wide distribution in Qld and is known from the Brigalow Belt North, Brigalow Belt South, Mulga Lands, South-east Qld, Einasleigh Uplands, Wet Tropics and Cape York Peninsula IBRA Regions (DotE, 2014c). ***Life History/Habitat*** The *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (SEWPaC, 2011a) states that habitat for the Yakka Skink is: *Open-forests to low-woodlands and scrub in Qld RE Land Zones (LZ) 3, 4, 5, 7, 8, 9, 10 and 12 (LZ 8 not considered core habitat; LZ 12 in Wet Tropics bioregion only). Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes.* ***Presence of this Species and/or its Habitat in the BNCOP Locality*** The Yakka Skink has not been recorded in the BNCOP Additional Footprint/Action Area. This species has database records in four locations within an 80 km radius around the BNCOP (Figure 16). The vegetation in the BNCOP Additional Footprint/Action Area occurs on Land Zones 3, 4 and 5 (approximately 277 ha), however the microhabitat required by this species is lacking across many vegetation patches and therefore potential habitat is conservatively considered to be all broad habitat types, except those mapped as disturbed (i.e. approximately 227.5 ha) (Figure 11).

Table 22 (Continued)
Assessments for Conservation Significant Fauna Species that are not Known or Considered Likely to Occur in the BNCOP Additional Footprint

Species	Conservation Status[1]		Assessment
	NC Act	EPBC Act	
Yakka Skink (*Egernia rugosa*) (cont')			***Likely Adverse Impacts on this Species*** The BNCOP would conservatively remove approximately 227.5 ha of potential habitat for this species. The BNCOP is not likely to significantly adversely impact this species given the absence of records in or near the BNCOP area and also because many areas of potential habitat are suboptimal.
Brigalow Scaly-foot (*Paradelma orientalis*)	V	-	***Distribution*** The Brigalow Scaly-foot occurs in Qld and is known from the Brigalow Belt North, Brigalow Belt South, Mulga Lands, Desert Uplands IBRA Regions (DotE, 2014c). The species was recently delisted under the EPBC Act. ***Life History/Habitat*** The Brigalow Scaly-foot inhabits open-forests to woodlands in Qld RE Land Zones 3, 4, 5, 7, 8 (near the periphery of LZ 10), 9 and 10 (SEWPaC, 2011a). ***Presence of this Species and/or its Habitat in the BNCOP Locality*** The Brigalow Scaly-foot has not been recorded in the BNCOP Additional Footprint. An area of mapped Essential Habitat occurs to the south-east of the BNCOP Additional Footprint (Figure 13). This species has database records in six locations within an 80 km radius around the BNCOP (Figure 16). The vegetation in the BNCOP Additional Footprint/Action Area occurs on Land Zones 3, 4 and 5 (approximately 277 ha), however the microhabitat required by this species is lacking across many vegetation patches, and therefore potential habitat is conservatively considered to be all broad habitat types, except those mapped as disturbed (i.e. approximately 227.5 ha) (Figure 11). ***Likely Adverse Impacts on this Species*** The BNCOP would conservatively remove approximately 227.5 ha of potential habitat for this species. The BNCOP is not likely to significantly adversely impact this species given the absence of records in the BNCOP Additional Footprint and given that most areas of potential habitat are suboptimal.
Birds			
Black-chinned Honeyeater (*Melithreptus gularis*)	NT	-	***Distribution*** The Black-chinned Honeyeater occurs in south-eastern Australia from Qld through Victoria to South Australia (Garnett *et. al.,* 2010) ***Life History/Habitat*** This species inhabits a variety of eucalypt woodlands but does not occur in patches <200 ha (Garnett *et. al.,* 2010; NSW Scientific Committee, 2001). ***Presence of this Species and/or its Habitat in the BNCOP Locality*** A database record of the Black-chinned Honeyeater occurs to the south of the BNCOP Additional Footprint (Figure 17). This species has not been recorded in the BNCOP Additional Footprint (Attachment A) but possibly the species uses Riparian Woodland Habitat (approximately 5 ha) and Open Eucalypt Woodland Habitat (approximately 243.5 ha). This species has not been recorded in the BNCOP Additional Footprint. ***Likely Adverse Impacts on this Species*** Approximately 5 ha of Riparian Woodland Habitat and 243.5 ha of Open Eucalypt Woodland Habitat would be removed in the BNCOP Additional Footprint (Figure 11). These habitat types occur more extensively in the surrounding locality (Table 15) and subregions (Table 14).

Table 22 (Continued)
Assessments for Conservation Significant Fauna Species that are not Known or Considered Likely to Occur in the BNCOP Additional Footprint

Species	Conservation Status[1]		Assessment
	NC Act	EPBC Act	
Mammals			
Koala (*Phascolarctos cinereus*)	SLC	V	***Distribution*** The EPBC Act listed 'Vulnerable' Koala is the combined populations of Qld, New South Wales and the Australian Capital Territory. ***Life History/Habitat*** The life history and habitat of the Koala has been well studied (DotE, 2014c). In late 2013, the DotE released the Draft *EPBC Act Referral Guidelines for the Vulnerable Koala (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)* (EPBC Act Referral Guidelines for the Koala) (DotE, 2013b). The EPBC Act Referral Guidelines for the Koala provides a habitat assessment tool for determining habitat critical to the survival of the Koala and the likelihood of a significant impact on this species. ***Presence of this Species and/or its Habitat in the BNCOP locality*** The Koala has not been recorded in the BNCOP Additional Footprint/Action Area. The closest record of this species is approximately 32 km north-west of the BNCOP Additional Footprint/Action Area (Figure 18). ***Likely Adverse Impacts on this Species*** In late 2013, the DotE released the Draft *EPBC Act Referral Guidelines for the Vulnerable Koala (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)* (EPBC Act Referral Guidelines for the Koala) (DotE, 2013b). The EPBC Act Referral Guidelines for the Koala provides a habitat assessment tool for determining habitat critical to the survival of the Koala and the likelihood of a significant impact on this species. These guidelines (and habitat assessment tool) are considered here in assessing the likelihood of adverse impacts on the Koala. Despite the occurrence of Riparian Habitat with potential Koala food trees (e.g. Queensland Blue Gum [*Eucalyptus tereticornis*]) in the BNCOP Additional Footprint/Action Area (approximately 5 ha) (Attachment A), the area has no koala occurrences and low habitat connectivity. There is no habitat critical to the survival of the Koala in the BNCOP Additional Footprint/Action Area, and a no-low risk of a significant impact on this species. Approximately 619 ha of Riparian Habitat has been mapped by RPS Australia East (2014) (Attachment A)(Table 15).

[1] Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. SLC=Special Least Concern.

5.5 MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE AND STATE SIGNIFICANT BIODIVERSITY VALUES

As described in Section 4.5, Matters of State Environmental Significance shown on the *State Planning Policy (SPP) Interactive Mapping System* (SDIP, 2014) output (Attachment D) are:

- regulated vegetation intersecting a watercourse (an ephemeral first order stream);
- wildlife habitat (also identified as Essential Habitat on the Regulated Vegetation Management Map [Section 4.4.5]);
- regulated vegetation (as shown on the Regulated Vegetation Management Map [Figure 8a]); and
- wetlands (i.e. the HESN wetland protection area).

The impacts on the above Matters of State Environmental Significance are described in Section 5.1.

As described in Section 4.5, State Significant Biodiversity Values are defined in the *Queensland Biodiversity Offset Policy (Version 1) 3 October 2011* (DERM, 2011). The Qld Government is currently reviewing the Qld environmental offset policies with a view to creating a single, integrated offset policy. However, until the review is complete, the current policies remain in effect (pers. comm. Qld Government, 2014). Likely adverse impacts on State Significant Biodiversity Values (DERM, 2011) are listed in Table 23.

Table 23
State Significant Biodiversity Values

State Significant Biodiversity Values[1]	Likely adverse impacts
Remnant Endangered regional ecosystems	Clearance of approximately 2.5 ha of RE11.3.1 (Vegetation Community 1a) and 2.5 ha of RE11.4.8a (Vegetation Community 3a) (Section 5.1; Table 14; Figure 9).
Remnant Of Concern regional ecosystems	Clearance of approximately 5 ha of RE11.3.4 (Vegetation Community 5) and approximately 63 ha of RE11.3.2 (Vegetation Community 7) (Section 5.1; Table 14; Figure 9).
High value regrowth vegetation containing Endangered regional ecosystems	Clearance of approximately 11.5 ha of RE11.3.1 (Vegetation Community 1b and 1c) and 2.5 ha of RE11.4.8a (Vegetation Community 3b) (Figure 9).
Essential habitat	Clearance of 24.96 ha of essential habitat for the Squatter Pigeon (*Geophaps scripta scripta*) mapped by DNRM (2013; 2014) (Figure 13).
Connectivity	Remnant vegetation in the BNCOP Additional Footprint is recognised as part of a bioregional corridor (DEHP, 2009) (Figure 6).
Watercourses	A first order watercourse occurs in the north of the BNCOP Additional Footprint as shown on the Vegetation Management Wetlands Map (Figure 8b) (DNRM 2014).
Protected animals	The likely adverse impacts on significant species in the BNCOP locality are described in Section 5.4, including the: • Ornamental Snake; • Squatter Pigeon (southern); and • Short-beaked Echidna.

[1] DERM (2011).

5.6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

5.6.1 Threatened Species under the EPBC Act

Potential adverse impacts on threatened species under the EPBC Act are assessed in Section 5.4.

5.6.2 Brigalow TEC

The Brigalow TEC is listed as 'Endangered' under the EPBC Act.

Description

The Brigalow TEC occurs roughly within the 500 to 750 mm annual rainfall belt (DotE, 2014c). The distribution of the Brigalow TEC extends from south of Charters Towers in Qld, south to northern NSW near Narrabri and Bourke (DotE, 2014c). In Qld, the TEC occurs predominantly within the Brigalow Belt North, Brigalow Belt South, Darling Riverine Plains and Southeast Qld bioregions, with smaller amounts in the Mitchell Grass Downs, Mulga Lands and Einasleigh Uplands bioregions (DotE, 2014c).

The Brigalow TEC is characterised by the presence of Brigalow (*Acacia harpophylla*) as one of the three most abundant tree species. Brigalow is usually dominant in the tree layer or co-dominant with other species such as Belah (*Casuarina cristata*), other species of *Acacia*, or species of *Eucalyptus* (DotE, 2014c). The Brigalow TEC is usually associated with deep gilgaied clays, sedentary clays, alluvial clays, miscellaneous deep clays and loamy red soils. The soils usually have a clay field-texture throughout the profile, are relatively fertile and tend to have high salt content (DotE, 2014c). In Qld, about 85% of the listed Brigalow TEC remnants occur on flat to gently undulating Cainozoic clay plains that are not associated with current alluvium, and on gently undulating landscapes on more or less horizontally bedded fine grained sedimentary rocks. About 10% of remnants are associated with river and creek flats, and the remainder with old loamy and sandy plains, basalt plains and hills, or hills and lowlands on metamorphic or granitic rocks (DotE, 2014c).

Presence of this TEC and/or its Habitat in the BNCOP Locality

The Brigalow TEC is represented by patches of Vegetation Communities 1a, 2 and 3a, as well as some patches of Vegetation Communities 1c and 3b (Table 8; Figure 10). A total of approximately 68 ha of Brigalow TEC is mapped (Figure 10). The patches of Brigalow TEC are small, degraded by edge effects and highly fragmented.

Likely Impacts on this Community

Three patches of Brigalow TEC with a combined area of approximately 9 ha occur within the BNCOP Additional Footprint/Action Area equating to 0.6 % of the BNCOP Additional Footprint/Action Area (Table 24; Figure 10). Two patches of remnant Brigalow TEC (approximately 2.5 ha in size) occur solely within the BNCOP Additional Footprint/Action Area and a third patch is partly inside the BNCOP Additional Footprint/Action Area (approximate 4 ha of a 10 ha patch) (Table 24; Figure 10).

Table 24
Proposed Clearance of the Brigalow TEC

TEC	Vegetation Community	Approximate Area (ha) to be Cleared (Figure 10)	Condition State*
Brigalow TEC	RE11.3.1: *Acacia harpophylla* ± *Eucalyptus populnea* Open Forest to Woodland[1]	2.5	Single patch of Remnant vegetation
	RE11.4.8a: *A. harpophylla* Palustrine Wetland[1]	2.5	Single patch of Remnant vegetation
	RE11.4.8a: *A. harpophylla* Disturbed Palustrine Wetland[2]	4	Single patch of High Value Regrowth
	Total	**9**	

* Condition State:
Remnant = Refer to definition in Section 4.2.
High Value Regrowth (Refer to definition in Section 4.2.1).

Table 25 provides an assessment on whether the likely adverse impact on this ecological community is significant in accordance with DotE (2013a) *Significant Impact Guidelines 1.1: Matters of National Environmental Significance*.

The Brigalow TEC is a highly cleared ecological community in the landscape. Habitat degradation from grazing livestock remains the most widespread threat to the Brigalow TEC in the BNCOP locality and habitat patches of Brigalow TEC are small, degraded by edge effects and highly fragmented.

Table 25
Likelihood of Significant Adverse Impacts on the Brigalow TEC - EPBC Act Assessment

Assessment Criteria[1] Is the BNCOP likely to:	**Assessment**	
Reduce the extent of an ecological community?	Yes	The BNCOP would require clearance of three patches of Brigalow TEC with a combined area of approximately 9 ha occurring within the BNCOP Additional Footprint/Action Area (Table 24; Figure 10). However, the patches of Brigalow TEC are small, degraded by edge effects and highly fragmented.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines?	Yes	The Brigalow TEC is already highly fragmented in the BNCOP Additional Footprint/Action Area, however the BNCOP would marginally increase the fragmentation of (distance between) the remaining Brigalow TEC patches in the south and north of the BNCOP locality (Figure 10).
Adversely affect habitat critical to the survival of an ecological community?	No	The occurrences of Brigalow TEC within the BNCOP Additional Footprint/Action Area are not likely to be critical to the survival of the Brigalow TEC given their degraded condition.
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?	No	The BNCOP would require clearance of Brigalow TEC and would be managed so as not to modify environmental factors necessary for the survival of Brigalow TEC surrounding the BNCOP Additional Footprint/Action Area.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?	No	The BNCOP would require clearance of Brigalow TEC. The BNCOP would be managed so as not to cause an adverse change in the species composition of Brigalow TEC surrounding the BNCOP Additional Footprint/Action Area.

Table 25 (Continued)
Likelihood of Significant Adverse Impacts on the Brigalow TEC - EPBC Act Assessment

Assessment Criteria[1] Is the BNCOP likely to:	**Assessment**	
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established, or • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or	No	The BNCOP would require clearance of Brigalow TEC. The BNCOP would be managed so as not to cause a reduction in the quality or integrity of Brigalow TEC surrounding the BNCOP Additional Footprint/Action Area.
Interfere with the recovery of an ecological community?	Yes	Land clearance is a recognised threat to Brigalow TEC. The BNCOP would require clearance of three patches of Brigalow TEC with a combined area of approximately 9 ha occurring within the BNCOP Additional Footprint/Action Area (Table 24; Figure 10). The patches of Brigalow TEC are small, degraded by edge effects and highly fragmented.

[1] As defined for the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DotE, 2013a).

Summary of EPBC Act Assessment

The BNCOP would require clearance of Brigalow TEC patches that are small, degraded by edge effects and highly fragmented. The BNCOP would be managed so as not to cause a reduction in the quality or integrity of Brigalow TEC surrounding the BNCOP Additional Footprint/Action Area.

An offset strategy is provided in Section 7. A key component of the offset strategy is to provide for the long-term protection and management of habitat for the Brigalow TEC.

5.6.3 Coolibah-Black Box Woodland TEC

The Coolibah-Black Box Woodland TEC is listed as 'Endangered' under the EPBC Act.

Description

The Coolibah-Black Box Woodland TEC is situated within the upper reaches of the Murray-Darling Basin and southern part of the Fitzroy River system (SEWPaC, 2011b). It is limited to the Darling Riverine Plains and Brigalow Belt South Bioregions, situated in northern NSW and southern Qld. The northern limit is the northern boundary of the Brigalow Belt South Bioregion in Qld (SEWPaC, 2011b).

The Coolibah-Black Box Woodland TEC represents occurrences of one type of Eucalypt woodland where Coolibah (*Eucalyptus coolabah*) and/or Black Box (*Eucalyptus largiflorens*) are the dominant canopy species and where the understorey tends to be grassy. The Coolibah-Black Box Woodland TEC is found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees (SEWPaC, 2011b).

Presence of this TEC and/or its Habitat in the BNCOP Locality

The Coolibah-Black Box Woodland TEC (Vegetation Community 4a – RE11.3.3) was recorded on floodplains of the Dawson River, Dawson River Anabranch and adjacent to the wetland to the north of the BNCOP Operational Land (Figure 10). A total of approximately 70 ha of Coolibah-Black Box Woodland TEC is mapped (Figure 10; Table 14). RE11.3.3 (Vegetation Community 4a) was found to be more extensive than identified on the Regulated Vegetation Management Map for the area (Figure 8a) (Attachment A), and it is noted that 5,409 ha of extant RE11.3.3 is considered to occur in the Dawson River Downs IBRA subregions (Accad *et. al.,* 2013) (Table 14).

Likely Impacts on this Community

A 1.5 ha portion of a larger patch of the Coolibah-Black Box Woodland TEC (with a total area of approximately 5.5 ha) occurs in the BNCOP Action Area (Figure 10), south of the wetland to the north of the BNCOP Operational Land. This patch of vegetation mostly comprises Black Box (*Eucalyptus largiflorens*) (Plate 6), and it is noted that the listing advice for the community (SEWPaC, 2011b) states that Coolibah (*Eucalyptus coolabah*) must be present in the tree canopy and is typically a dominant. However, Vegetation Community 4a has been classed as the Coolibah-Black Box Woodland TEC on the basis that the conservation advice for the community (SEWPaC, 2011b) states that the community can have dominance of Coolibah (*Eucalyptus coolabah*) and/or Black Box (*Eucalyptus largiflorens*).

In the referral submitted 24 October 2013 (EPBC 2013/7036), the 1.5 ha area of Coolibah-Black Box Woodland TEC was proposed to be cleared, however, following further refinement of the mine design, the Coolibah-Black Box Woodland TEC in the BNCOP Operational Land would be avoided and not cleared.

5.7 SUMMARY OF IMPACTS ON CONSERVATION SIGNIFICANT SPECIES

Table 26 provides a summary of the quantity of potential habitat for conservation significant vertebrate fauna species that would be removed by the BNCOP, irrespectively of whether the species have been recorded in the BNCOP Additional Footprint.

Table 26
Quantification of Impacts on Habitat for Conservation Significant Species

Common Name	Conservation Status[1]		Recorded in the BNCOP Additional Footprint	Area of Habitat in the BNCOP Additional Footprint	Conservative Assessment of Potential Habitat
	NC Act	EPBC Act			
Reptiles					
Ornamental Snake	V	V	No	33.5 ha	Potential habitat is outlined in Table 18 and shown on Figure 14.
Collared Delma	V	V	No	82 ha	RE11.3.1, RE11.3.4 and RE11.3.2 (Figure 9).
Yakka Skink	V	V	No	227.5 ha	All broad habitat types, except those mapped as disturbed (Figure 11).
Brigalow Scaly-foot	V	-	No	227.5 ha	All broad habitat types, except those mapped as disturbed (Figure 11).

Table 26 (Continued)
Quantification of Impacts on Habitat for Conservation Significant Species

Common Name	Conservation Status[1]		Recorded in the BNCOP Additional Footprint	Area of Habitat in the BNCOP Additional Footprint	Conservative Assessment of Potential Habitat
	NC Act	EPBC Act			
Birds					
Squatter Pigeon (southern)	V	V	Yes	277 ha	All broad habitat types (277 ha) and potentially approximately 1,164 ha of cleared grazing paddocks in the BNCOP Additional Footprint [and approximately 1,318 ha in the BNCOP Action Area] (Figure 11).
Black-necked Stork	NT	-	Yes	6 ha	Riparian Woodland Habitat (Figure 11) and a farm dam (lucustrine wetland) (Figure 7).
Cotton Pygmy-goose	NT	-	Yes	6 ha	Riparian Woodland Habitat (Figure 11) and a farm dam (lucustrine wetland) (Figure 7).
Black-chinned Honeyeater	NT	-	No	5 ha	Riparian Woodland Habitat (Figure 11).
Mammals					
Short-beaked Echidna	SLC	-	Yes	277 ha	All broad habitat types (Figure 11).
Koala (combined populations of Qld, NSW and ACT)	SLC	V	No	5 ha	Riparian Woodland Habitat (Figure 11).
Little Pied Bat	NT	-	Yes	277 ha	All broad habitat types (Figure 11).
*South-eastern Long-eared Bat	V	V	Possibly	277 ha	All broad habitat types (Figure 11).

* The South-eastern Long-eared Bat (*Nyctophilus corbeni*) may have been recorded in the BNCOP locality but the Anabat call recordings are not definitive (Attachment A).

[1] Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. NT=Near Threatened. SLC=Special Least Concern.

6 IMPACT AVOIDANCE AND MITIGATION MEASURES

According to the ToR for the BNCOP, the BNCOP is to meet the following environmental objectives under the EP Act:

- [the] *activity is operated in a way that protects the environmental values of associated flora and fauna;*
- [the] *choice of the site, at which the activity is to be carried out, minimises serious environmental harm on areas of high conservation value and special significance;*
- [the] *location for the activity on a site protects all environmental values relevant to adjacent sensitive use; and*
- [the] *design of the facility permits the operation of the site, at which the activity is to be carried out, in accordance with best practice environmental management.*

The following practical measures to avoid and mitigate adverse impacts from the BNCOP on terrestrial flora and fauna are outlined below:

- refinement of the mine design to avoid land clearance (Section 6.1);
- vegetation clearance procedures (Section 6.2);
- management of conservation significant species (Section 6.3);
- progressive rehabilitation (Section 6.4);
- declared animal control strategies (Section 6.5);
- weed management (Section 6.6);
- control of cattle grazing (Section 6.7);
- bushfire prevention and management (Section 6.8);
- miscellaneous programs (i.e. noise and dust management, artificial lighting, water management, erosion and sediment control, and vehicle speed limits) (Section 6.9);
- education (Section 6.10); and
- monitoring (Section 6.11).

The *Environmental Management Plan for Wonbindi North* (MLA80170) (CCL, 2012) would be revised to incorporate these measures for the BNCOP (in accordance with the relevant State and Commonwealth approval documentation).

6.1 REFINEMENT OF THE MINE DESIGN TO AVOID LAND CLEARANCE

A number of alternatives to the BNCOP were considered by CCL in the development of the BNCOP description (including consideration of the location for the BNCOP, mining method, minimising the additional project surface development area and hours of operation). The following refinements to the mine design have resulted in minimising additional land disturbance:

- optimising the backfilling of the open cut to minimise the overall mine footprint;
- extending the height and extent of the existing spoil dumps where possible (i.e. dumping over and extending the existing mine landforms) rather than establishing new spoil dumps; and
- continued use of existing open cut void (e.g. for water and CHPP reject storage to reduce the need for specifically constructed storages).

As described in Section 5.1, clearance of conservation significant vegetation would be required for the placement of spoil and infrastructure. The spoil dumps and infrastructure are located next to the proposed BNCOP pit to minimise the overall footprint of the mine (and reduce cartage of spoil).

The measures described in Table 27 would be adopted to avoid adverse impacts on particular features/areas of vegetation, fauna habitat and watercourses. Buffer zones would be applied as described in Table 27 and shown on Figure 2.

Table 27
Impact Avoidance Measures

Feature	Measure
Dawson River and Dawson River Anabranch	No riparian vegetation associated with the Dawson River and Dawson River Anabranch would be cleared (Figure 2). The riparian vegetation is recognised as potential fauna movement corridor. There the BNCOP, the riparian vegetation comprises RE11.3.3 and RE11.3.4, which are 'Of Concern' regional ecosystems (Figure 9).
North-west Soak (Plate 17)	A 200 m buffer established around the North-west Soak (within the BNCOP Operational Land) as part of the approved Baralaba North/Wonbindi North Mine (Figure 2) would be maintained as part of the BNCOP. The North-west Soak comprises of RE11.3.27i (Figure 9) and is known habitat for the Little Pied Bat.
HESN Wetland Protection Area	A 200 m buffer would be established around the HESN Wetland Protection Area (within the BNCOP Operational Land) (Figure 2).
Wetland to the North of the BNCOP Operational Land (Plate 18)	The proposed BNCOP pit was designed with a 100 m step-back from the wetland to the north of the BNCOP Operational Land (Figure 3). The wetland to the north of the BNCOP Operational Land is RE11.3.4, an 'Of Concern' RE (Figure 9). It is also known habitat for the Ornamental Snake and the Squatter Pigeon (south) (*Geophaps scripta scripta*) (also essential habitat for the pigeon).
Coolibah-Black Box Woodland TEC	A 1.5 ha portion of a larger patch of the Coolibah-Black Box Woodland TEC (with a total area of approximately 5.5 ha) occurs in the BNCOP Action Area (Figure 10). In the referral submitted 24 October 2013, the 1.5 ha area of Coolibah-Black Box Woodland TEC was proposed to be cleared, however, following further refinement of the mine design, the Coolibah-Black Box Woodland TEC in the BNCOP Operational Land would be avoided and not cleared.

To prevent accidental disturbance to the features identified, any construction activities proposed within 50 m from the buffer around the features would only commence after a temporary fence (e.g. high visibility barrier tape and signage) is erected between the feature and the proposed construction area. The fence would be removed after the construction activities in the location are complete.

The North-west Soak and HESN Wetland Protection Area (Figure 2) would be subject to exclusion of cattle grazing (Section 6.7), declared animal management (Section 6.5) and weed management (Section 6.6).

6.2 VEGETATION CLEARANCE PROCEDURES

Vegetation clearance procedures would be adopted for the BNCOP and include:

- Boundaries of areas to be cleared, and those not to be cleared (Table 27), would be defined during construction and operation.
- An internal Permit to Disturb would be required prior to any clearing so that clearing activities are authorised prior to disturbance.
- Clearing of native vegetation would be undertaken progressively over 15 years and only in areas required for mining activities within the following year. This would have the effect of minimising the area of exposed land.
- Preclearance fauna surveys would be undertaken by suitably experienced and qualified persons.
- A suitably trained and qualified person would be present during the clearing of habitat.

- Management of fauna identified during clearing may include relocating individuals to adjacent habitat or treating injuries.
- Pre-clearance surveys to detect Ornamental Snakes within habitat proposed to be cleared. Ornamental Snakes encountered would be moved into adjoining habitat outside the area to be cleared.
- Clearing wood/forest habitat (potential habitat for the Squatter Pigeon [southern] [*Geophaps scripta scripta*]) outside of its breeding period (July to May), where practicable.
- Salvage and reuse of selected trees (e.g. tree hollows) for use as fauna habitat in rehabilitation areas (e.g. habitat logs).
- Although unlikely, if a Koala is found, it would be left to move away from the clearance area on its own accord.

6.3 MANAGEMENT OF CONSERVATION SIGNIFICANT SPECIES

Separate to the EIS approval process, CCL would need to comply with the NC Act requirements by preparing a Species Management Program (under section 332 of the Nature Conservation [Wildlife Management] Regulation, 2006) prior to disturbing animal breeding places. The Species Management Program must be approved by the DEHP. Table 28 provides specific management measures for conservation significant fauna species which would be integrated in to the Species Management Program.

Table 28
Specific Management Measures for Conservation Significant Fauna Species

Species	Conservation Status[1]		Management
	NC Act	EPBC Act	
Threatened Species			
Ornamental Snake (*Denisonia maculata*)	V	V	The following measures would be undertake to reduce potential adverse impacts on the Ornamental Snake: • The proposed BNCOP pit was designed with a 100 m step-back from the wetland to the north of the BNCOP Operational Land, where the Ornamental Snake was found (Figure 12). The areas to be avoided (Table 27) would be identified in the Environmental Management Plan and to prevent accidental disturbance to the features, any construction activities proposed within 50 m from the buffer around the features would only commence after a temporary fence (e.g. high visibility barrier tape and signage) is erected between the feature and the proposed construction area. • Vegetation clearance procedures, including pre-clearance surveys to detect Ornamental Snakes within habitat proposed to be cleared. Ornamental Snakes encountered would be moved into suitable adjoining habitat. • A feral animal management strategy would be implemented to monitor and control feral animals (such as feral pigs). Feral pigs can degrade habitat for the Ornamental Snake (after Melzer, 2012; DotE, 2014c). • Weed management (prevention, monitoring and control) would be undertaken. It is noted that weed invasion is a factor that possibility influences the occurrence of the Ornamental Snake (after DotE, 2014c). • Livestock would be selectively excluded from the mining lease for the life of the mine. The Ornamental Snake may benefit from the removal of livestock grazing as over-grazing is a recognised threat to Ornamental Snakes (after Melzer, 2012; DotE, 2014c).

Table 28 (Continued)
Specific Management Measures for Conservation Significant Fauna Species

Species	Conservation Status[1]		Management
	NC Act	EPBC Act	
Threatened Species			
Ornamental Snake (cont)	V	V	• Bushfire prevention would be undertaken, noting that the Ornamental Snake occurs in Brigalow Woodland and uses groundcover which is susceptible to fire (after Melzer, 2012). • Site water management would help avoid indirect impacts on Ornamental Snake habitat arising from alteration of hydrology or water quality (after DotE, 2014c).
Squatter Pigeon (southern) (*Geophaps scripta scripta*)	V	V	The following measures would be undertake to reduce potential adverse impacts on the Squatter Pigeon (southern): • Impact avoidance measures outlined in Table 27 (since the Squatter Pigeon [southern] was recorded across a variety of habitats including those outlined in Table 27). • Vegetation clearance procedures, including clearing potential habitat for the Squatter Pigeon outside of its breeding period (July to May), where practicable. • A feral animal management strategy would be implemented to monitor and control feral animals (such as the European Rabbit, Feral Cat and European Red Fox). • Livestock would be selectively excluded from the mining lease for the life of the mine. • Rehabilitation using native species typical of the surrounding area.
South-eastern Long-eared Bat (*Nyctophilus corbeni*)	V	V	The following measures would be undertake to reduce potential adverse impacts on Long-eared Bats (including the South-eastern Long-eared Bat were it to occur): • Impact avoidance measures outlined in Table 27 (since Long-eared Bats were recorded across a variety of habitats including those outlined in Table 27). • Vegetation clearance procedures, including pre-clearance surveys to detect bats within habitat proposed to be cleared and/or where trees are to be felled to minimise impacts to hollow-dwelling animals (which may include Long-eared Bats). • Bushfire prevention would be undertaken, noting that fire can reduce hollow-bearing trees in which Long-eared Bats roost. • Rehabilitation using native species typical of the surrounding area.
Near Threatened			
Black-necked Stork (*Ephippiorhynchus asiaticus*)	NT	-	The following measures would be undertake to reduce potential adverse impacts on the Black-necked Stork: • Impact avoidance measures outlined in Table 27 (since this species could potentially use the features listed in Table 27). • A feral animal management strategy would be implemented to monitor and control feral animals which may present a threat to this species.
Cotton Pygmy-goose (*Nettapus coromandelianus*)	NT	-	The following measures would be undertake to reduce potential adverse impacts on the Cotton Pygmy-goose: • Impact avoidance measures outlined in Table 27 (since this species could potentially use the features listed in Table 27). • A feral animal management strategy would be implemented to monitor and control feral animals which may present a threat to this species.

Table 28 (Continued)
Specific Management Measures for Conservation Significant Fauna Species

Species	Conservation Status[1]		Management
	NC Act	EPBC Act	
Near Threatened			
Little Pied Bat (*Chalinolobus dwyeri*)	NT	-	The following measures would be undertake to reduce potential adverse impacts on the Little Pied Bat: • Impact avoidance measures outlined in Table 27 (since Little Pied Bats were recorded across a variety of habitats including those outlined in Table 27). • Vegetation clearance procedures, including pre-clearance surveys to detect bats within habitat proposed to be cleared and/or where trees are to be felled to minimise impacts to hollow-dwelling animals (which may include the Little Pied Bat). • Rehabilitation using native species typical of the surrounding area.
Special Least Concern			
Short-beaked Echidna (*Tachyglossus aculeatus*)	SLC	-	The following measures would be undertake to reduce potential adverse impacts on Short-beaked Echidna: • Impact avoidance measures outlined in Table 27 (since the Short-beaked Echidna could potentially occur across a variety of habitats including those outlined in Table 27). • Vegetation clearance procedures, including pre-clearance surveys to detect animals (such as the Short-beaked Echidna) within habitat proposed to be cleared and managing clearing works to minimise injury to the fauna detected. • Rehabilitation using native vegetation species typical of the surrounding area.

[1] Threatened Species Status under the NC Act and EPBC Act (current as of March 2014).
V = Vulnerable. NT=Near Threatened. SLC=Special Least Concern.

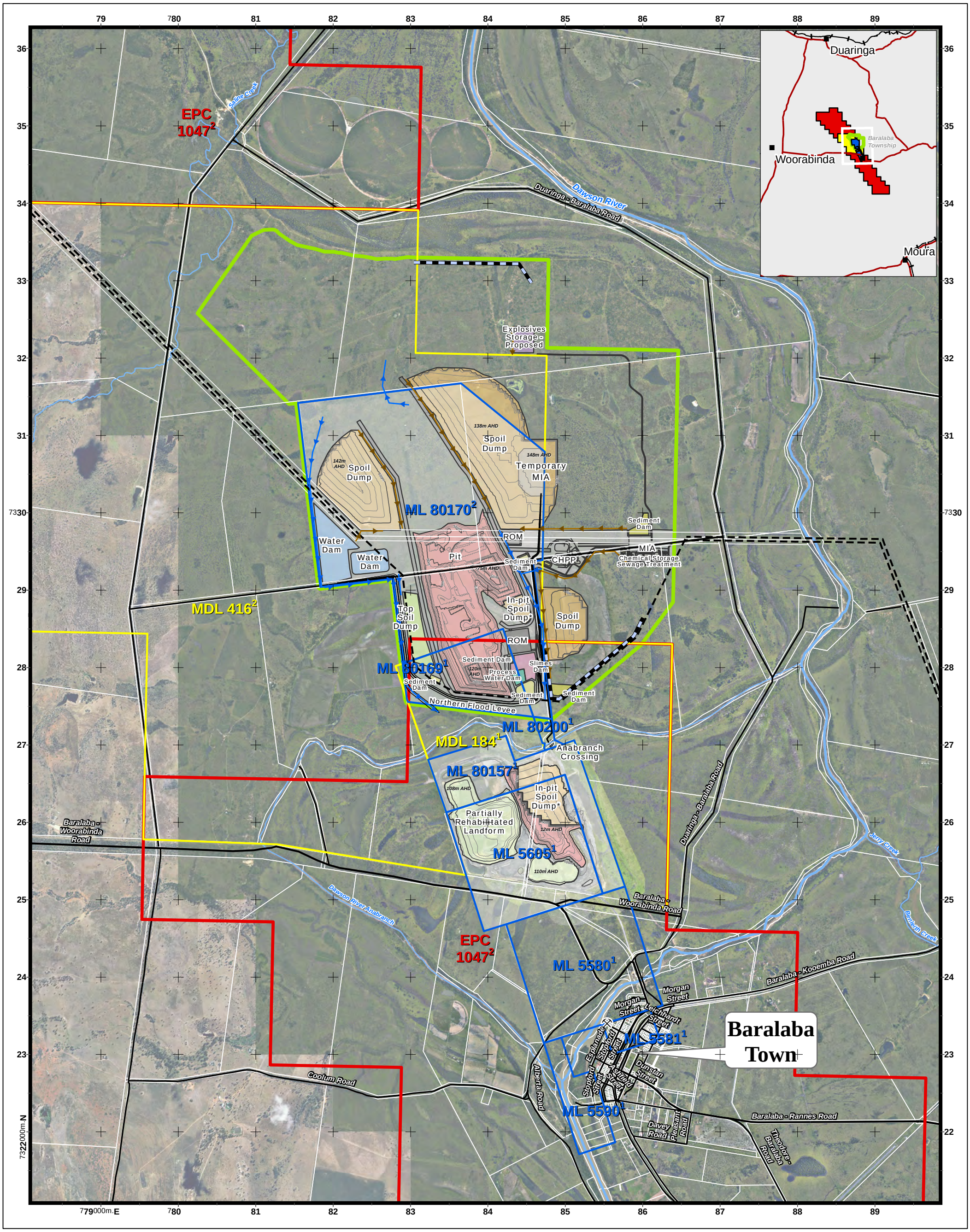
6.4 REHABILITATION

The rehabilitation objectives, success criteria, monitoring program, auditing regime and corrective actions are provided in the EIS. An overview of the rehabilitation program in relation to the terrestrial flora and fauna is provided below.

The BNCOP disturbance areas (e.g. waste emplacements and infrastructure areas) would be progressively rehabilitated and revegetated, so the post-mining landforms are safe and stable. Rehabilitation would commence within one year of areas becoming available. The indicative mine layout at Year 3 (end of 2017) is shown on Figure 19 and the indicative mine layout at Year 15 (end of 2029) is shown on Figure 20.

The revegetation program would aim to provide a minimum vegetation cover of 70%. Areas not covered with vegetation would be minimised and vegetation growth is to be promoted if required. The flora species composition and vegetation community structure [ground cover, understorey and overstorey] of the revegetation would be similar to appropriate reference sites, chosen on the basis of their current land use, soil type, vegetation community type and health.

The revegetation program also aims to provide outcomes for fauna species with similar faunal species diversity to be present in the rehabilitated lands at mine closure compared with current species diversity or representative of similar undisturbed habitats in the surrounds.



PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.			N 0 500 1,000 1,500 2,000 Metres	DATA SOURCES: VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA. *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	*NOTE:* *¹: HELD BY BARALABA COAL PTY LTD* *²: HELD BY WONBINDI COAL PTY LTD* **: INCLUDING CHPP REJECTS CO-DISPOSAL*
TITLE **Figure 19** **Project Layout** **Year 3**	REV	DESCRIPTION	DATE	SCALE **1:45,000**	CURRENT ISSUE SIGNATURES	
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	2	Text Updates	11/03/14	DATUM GDA 94	CHECKED	BJD
	3	Data & Text Updates	04/04/14	PROJECTION MGA Zone 55	APPROVED	BJD

Legend

Road..... Watercourse..... Cadastre..... Cockatoo Coal ML..... Cockatoo Coal MDL..... Cockatoo Coal EPC.....

Powerline & Power Pole..... BNCOP Operational Land..... Clean Water Drain..... Dirty Water Drain..... Proposed Flood/Erosion Protection Levee.....

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STATUS **FINAL**

PROJECT NO	DRAWING NO
Baralaba Nth	BBN-098-20-03-140404

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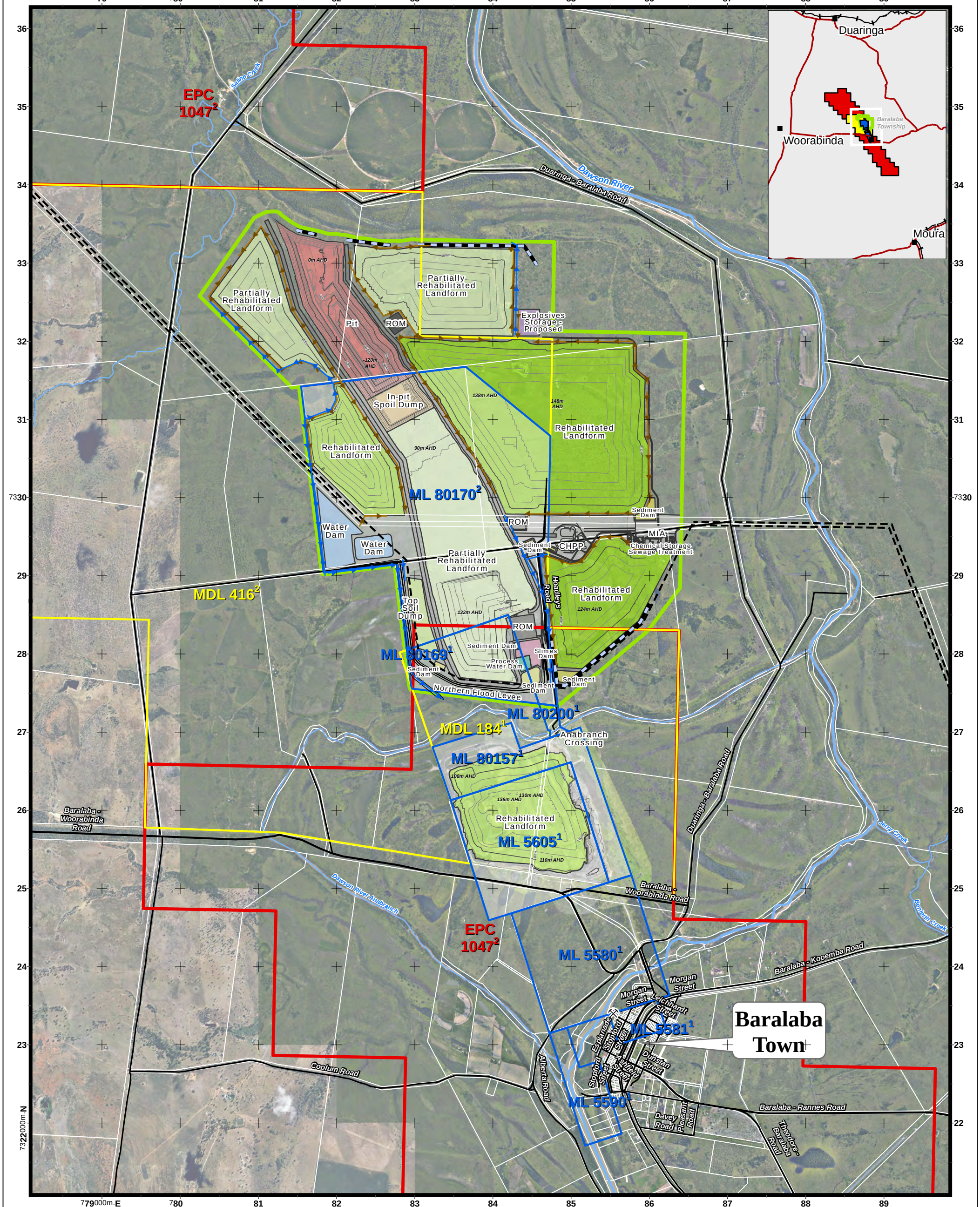

PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

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Legend

Road.....
Watercourse.....
Cadastre.....
Cockatoo Coal ML.....
Cockatoo Coal MDL.....
Cockatoo Coal EPC.....
Powerline & Power Pole.....
BNCOP Operational Land.....
Clean Water Drain.....
Dirty Water Drain.....
Proposed Flood/Erosion Protection Levee.....

Cockatoo Coal Limited

TITLE

Figure 20
Project Layout
Year 15

REV	DESCRIPTION	DATE
0	Original map output	03/10/13
2	Text Updates	11/03/14
3	Data & Text Updates	04/04/14

SCALE **1:45,000**
SIZE A3
DATUM GDA 94
PROJECTION MGA Zone 55

CURRENT ISSUE SIGNATURES

DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

STATUS **FINAL**

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In accordance with the ToR for the BNCOP, the rehabilitation program would incorporate, where appropriate, provision of nest hollows and ground litter. The ground-layer vegetation and low shrubs would be incorporated into the topsoil when it is stripped. Habitat features (e.g. trunks, logs, branches, small stumps and roots) would be salvaged during vegetation clearance activities and relocated to areas undergoing rehabilitation.

Piles of trunks, logs, branches, small stumps and roots can provide habitat for reptiles (Wilson, 2003). In addition, valuable habitat niches would be provided for a range of invertebrate and ground-dwelling fauna that require log cover.

As described in Section 5.2.8, a final void would remain at the end of the mine life. A Void Management Plan would be prepared for the BNCOP. The Void Management Plan would, as a minimum include final landform capability study to support native flora and fauna.

The rehabilitation objectives are not specifically aimed at providing a movement corridor for wildlife, however, all mine disturbance areas would be revegetated to woodland/forest thus providing more extensive woodland/forest (compared to the currently fragmented habitats) and greater connectivity of habitats either side of the BNCOP.

6.5 DECLARED ANIMAL CONTROL STRATEGIES

Declared animals are known to occur in the locality (Attachment A; Section 4.4.3) and most represent a threat to threatened fauna species also known to occur. The following species listed under the LP Act have been recorded in the locality:

- Feral Pig (*Sus scrofa*) (Class 2 under the LP Act);
- European Rabbit (*Oryctolagus cuniculus*) (Class 2);
- Feral Cat (*Felis catus*) (Class 2); and
- European Fox (*Vulpes vulpes*) (Class 2).

Declared animals would be discouraged at the BNCOP by maintaining a clean, rubbish-free environment. Appropriately qualified persons would be engaged to undertake bi-annual pest animal monitoring in the BNCOP Operational Land. Feral animal control strategies (e.g. baiting, trapping) would be implemented in the BNCOP Operational Land in accordance with relevant standards to maintain low abundance of declared animals. The following threat abatement plans would be relevant:

- *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (Department of the Environment and Heritage, 2005);
- *Competition and Land Degradation by Rabbits* (DEWHA, 2008a);
- *Threat Abatement Plan for Predation by Feral Cats* (DEWHA, 2008b); and
- *Threat Abatement Plan for Predation by the European Red Fox* (DEWHA, 2008c).

Appropriately qualified persons would be engaged to undertake bi-annual pest animal control in the BNCOP Operational Land.

6.6 WEED MANAGEMENT

Weed management (prevention, monitoring and control) would be undertaken to lessen the abundance and species of weeds in the BNCOP Operational Land and minimise the potential for weeds to spread into adjacent habitat areas. As described in Section 4.3.3, exotic flora species occur extensively across the BNCOP Additional Footprint, likely due to the high level of past clearance and the current land use (e.g. grazing) (Attachment A). Weeds that are present on-site would be identified by regularly surveying (of tracks, revegetation (rehabilitation) areas and topsoil stockpiles, etc.) on a bi-annual basis.

Declared plants that are listed under the LP Act would be specifically targeted for control (note: there are legal obligations associated with the control, supply, sale, keeping and transport of declared plants in Qld). A low abundance of four weeds declared under the LP Act were recorded by RPS Australia East (2014) (Attachment A) during the survey of the BNCOP locality, namely the Velvety Tree Pear (*Opuntia tomentosa*), Fireweed (*Senecio madagascariensis*), Mother of Millions (*Bryophyllum* spp.) and Lantana (*Lantana camara*).

Weed prevention techniques would be implemented in the BNCOP Operational Land and include washdown of machinery when moving from weed infested areas. Weed control techniques would be implemented in the BNCOP Operational Land as required. Physical removal and chemical application are the main weed control methods available. Specific weed control methods would be in accordance with those specified by the Qld Department of Agriculture, Fisheries and Forestry (2014). The control techniques used would be documented and areas subject to weed control would be mapped for follow-up inspection and management.

6.7 CONTROL OF CATTLE GRAZING

Cattle would be selectively excluded from the BNCOP Operational Land for the life of the BNCOP. Cattle would be excluded from the area of exclusion of mining activities (North-west Soak and HESN Wetland Protection Area) (Figure 2).

6.8 BUSHFIRE PREVENTION AND MANAGEMENT

Bushfire prevention and management measures would include:

- educating employees and contractors on general fire awareness, proper use of the fire fighting equipment and response procedures;
- provision of fire fighting equipment around the site; and
- construction and maintenance of fire breaks in the BNCOP Operational Land.

6.9 MISCELLANEOUS PROGRAMS

A number of management measures would be implemented to manage erosion and sediment, noise, dust, artificial lighting, water and vehicle traffic. A brief overview of some of the key measures is provided below.

Erosion and Sediment Control

Erosion protection levees would be constructed at points around the spoil dumps. The objective of the erosion protection levees would be to prevent spoil dump erosion during flood events. Sedimentation controls would involve the construction of sediment dams to manage runoff from spoil dumps and the timely progressive rehabilitation and establishment of vegetation on disturbed areas to minimise the area exposed to erosion.

Noise Management

Noise management measures would be implemented including the use of low noise equipment and operational controls where possible.

Dust Management

Dust management at the BNCOP would include staged vegetation clearing (to avoid unnecessary clearing ahead of construction), progressive rehabilitation and spraying water over roads (access and haul roads).

Artificial Lighting

Whilst ensuring the operational safety is not compromised, CCL would seek to minimise light emissions from the BNCOP by select placement, configuration and direction of lighting as to reduce off-site nuisance where practicable. CCL would take all reasonable and feasible measures, in consideration of Australian Standard (AS) 4282:1997 *Control of the obtrusive effects of outdoor lighting*, to mitigate visual and off-site lighting impacts of the BNCOP.

Water Management

Water management infrastructure proposed for the BNCOP include flood levees, diversion drains, sediment control structures, storage dams, pumps and pipelines. The water collected in water storages is captured and retained for use on-site and/or controlled off-site discharge. The site water dams that manage contaminated water are designed and operated to achieve zero uncontrolled discharge.

Vehicle Traffic Management

Normal road rules would apply on all CCL properties and speed limits would be enforced and clearly signed on mine roads.

6.10 EDUCATION

All employees and contractors be required to undertake an induction and environmental awareness program prior to working on site. The program would raise awareness of:

- clearing limits and mining exclusion areas;
- access restrictions;
- general fire awareness, proper use of the fire fighting equipment and response procedures;
- vehicle speed limits; and
- procedures for threatened species that may be encountered on-site (i.e. the Ornamental Snake and Squatter Pigeon).

6.11 MONITORING

Table 29 outlines how the measures to achieve the relevant environmental objectives would be monitored as part of the BNCOP.

Table 29
Monitoring Program

Measure	Timing of Monitoring	Measurable Key Performance Indicator
Refinement of the Mine Design to Avoid Land Clearance	Ongoing during construction, operation and decommissioning.	Features listed in Table 27 have been avoided.
Vegetation Clearance Procedures	Ongoing during construction.	Clearing of native vegetation was undertaken in areas required for mining activities within the following year. A suitably trained and qualified person has been present during the clearing of habitat.
Management of Conservation Significant Species	Ongoing during construction, operation and decommissioning.	A Species Management Program (Section 6.3) has been prepared and is being implemented.
Progressive Rehabilitation	Annual.	The rehabilitation objectives, success criteria, monitoring program, auditing regime and corrective actions are provided in the EIS.
Declared Animal Control Strategies	Bi-annually.	Monitoring of declared animals has identified abundance of declared animals and declared animals are reduced.
Weed (Declared Plant) Management	Bi-annually.	Weed monitoring has identified priority areas for weed management and weeds in the priority areas are reduced.
Control Of Cattle Grazing	Ongoing during construction, operation and decommissioning.	Cattle are selectively excluded from the BNCOP Operational Land for the life of the BNCOP.
Bushfire Prevention and Management	Ongoing during construction, operation and decommissioning.	Employees and contractors are educated on fire related matters (Section 6.8); Fire fighting equipment has been placed around the site. Fire breaks have been constructed (where required).

In the event that monitoring shows that the relevant environmental objectives are not being met, contingency measures would need to be implemented as required. For example, if monitoring shows an incursion of weed species then weed control may need to be undertaken more frequently.

Auditing of the BNCOP against the relevant environmental objectives would be undertaken by CCL.

7 OFFSET STRATEGY

Measures that are proposed to avoid and mitigate impacts from the BNCOP on terrestrial flora and fauna (including State significant biodiversity values) are described in Section 6. This section describes an offset strategy aimed at addressing the residual impacts. This Offset Strategy has been prepared in consideration of the:

- ToR for the BNCOP (specifically Appendix 2 of the ToR for the BNCOP, titled *Matters of National Environmental Significance*); and
- Qld *Biodiversity Offset Policy (Version 1) 3 October 2011* (DNRM, 2011).

7.1 OFFSET POLICIES

The *Terms of Reference for the Baralaba North Continued Operations Project Environmental Impact Statement* state:

> *…where Queensland legislation or a specific-issue offset policy requires an offset for a significant residual impact on a particular natural environmental value, the offset proposal(s) shall be presented in a form consistent with relevant legislation and policy.*

The Qld Government currently has five offset policies (an overarching *Environmental Offsets Policy* [Environmental Protection Agency, 2008] and four specific-issue offset policies that apply to select developments). The Qld Government is currently reviewing all five environmental offset policies with a view to creating a single, integrated offset policy. The Environmental Offsets Bill 2014 was tabled in Parliament on 13 February 2014 for the proposed new *Environmental Offsets Act 2014* (Qld). However, until the review is complete, the current policies remain in effect (pers. comm. Qld Government, 2014).

According to the Environmental Offsets Bill 2014 the *Environmental Offsets Act 2014* (Qld) would apply to the BNCOP if it commences prior to submitting the application to amend the Environmental Authority. The Environmental Offsets Bill 2014 explanatory note states:

> *…any amendment to an authority after the commencement of the Act that may or is likely to result in a significant residual impact on a prescribed environmental matter must be dealt with under this Act* (Environmental Offsets Act 2014).

Given the uncertainty with regards to the Qld offset policy that would apply to the BNCOP, CCL would provide an offset proposal (or its equivalent) after submission of the EIS.

As described in Section 5.5, the BNCOP would impact threatened species and communities listed under the EPBC Act and an offset would be provided for residual impacts on the Ornamental Snake, Squatter Pigeon (southern), South-eastern Long-eared Bat and Brigalow TEC. An offset would be provided using the *EPBC Act Environmental Offsets Policy* [SEWPaC, 2012] (and supporting *EPBC Act Offsets Assessment Guide*) and/or any new requirements under the *Environmental Offsets Act 2014* (Qld).

7.2 OFFSET TIMING

An offset proposal would be lodged with the State and Commonwealth Government prior to commencement of construction activities in accordance with the relevant offset policies (e.g. *EPBC Act Environmental Offsets Policy* [SEWPaC, 2012], Qld *Biodiversity Offset Policy* [Version 1] *3 October 2011* [DNRM, 2011] and/or any new requirements under the *Environmental Offsets Act 2014* [Qld]).

The timing for procuring the offset would be subject to the offset requirements in accordance with the relevant offset policies.

7.3 OFFSET DELIVERY MECHANISM

The offset delivery mechanism (land-based offsets; direct benefit management plans; offset transfers and/or offset payments) would be determined in the offset proposal depending on the relevant offset policies at the time of providing the offset proposal.

7.4 EXPECTED IMPACTS

Potential adverse impacts from the BNCOP are assessed in Section 5. The Qld *Biodiversity Offset Policy (Version 1) 3 October 2011* (DNRM, 2011) requires offset strategies to outline the expected impacts from the BNCOP represented spatially. The following figures provide this information:

Figure 3 Project Layout.
Figure 9 Ground-truthed Vegetation Communities.
Figure 10 Threatened Ecological Communities.
Figure 11 Broad Fauna Habitat Types.
Figure 12 Conservation Significant Fauna.
Figure 13 Essential Habitat.
Figure 14 Ornamental Snake Potential Habitat.

7.5 STATE SIGNIFICANT BIODIVERSITY VALUES

The Qld *Biodiversity Offset Policy (Version 1) 3 October 2011* (DNRM, 2011) requires offset strategies to outline values that would be impacted. State Significant Biodiversity Values relevant to the BNCOP are (Section 4.5):

- Remnant 'Endangered' regional ecosystems (Section 5.1; Table 14; Figure 9).
- Remnant 'Of Concern' regional ecosystems (Section 5.1; Table 14; Figure 9).
- High value regrowth vegetation containing Endangered regional ecosystems (Figure 9).
- Essential habitat (Section 4.4.5 and Figure 13).
- Connectivity (Section 4.2.6 and Figure 6).
- Watercourses (Figure 8b).
- Protected animals (Ornamental Snake, Squatter Pigeon [southern] and Short-beaked Echidna).

All or only some of the above listed State Significant Biodiversity Values may be applicable to the BNCOP Offset Strategy depending on the relevant offset policies at the time of providing the offset proposal.

7.6 OFFSET APPROACH AND REPORTING FRAMEWORK

The offset approach and reporting framework would be determined in the offset proposal depending on the relevant offset policies at the time of providing the offset proposal.

The ToR for the BNCOP (specifically Appendix 2 of the ToR for the BNCOP, titled *Matters of National Environmental Significance*) requires a discussion of the location, area, habitat quality tenure arrangements and proposed management measures. This information would be provided in the offset proposal.

7.7 OFFSET LAND INVESTIGATION

CCL has commenced investigations to identify suitable offset lands which are currently focused on adjacent CCL-owned lands including Brigalow Woodland patches with known Squatter Pigeon (southern) records to south-east of the BNCOP Operational Land, and other lands with potential habitat adjacent to known Ornamental Snake records.

8 CONCLUSION

This terrestrial ecology assessment describes how the BNCOP has been designed to avoid a number of ecological features in the landscape, however unavoidable adverse impacts on terrestrial ecology would still occur from removal and reduction of patches of woodland/forest (totalling approximately 277 ha) during construction and operation. It is also recognised that localised indirect impacts are also likely to occur on surrounding habitats during construction and operation of the mine (e.g. dust, noise, edge effects).

CCL has committed to a number of measures with the aim of mitigating unavoidable adverse impacts on terrestrial ecology, including:

- vegetation clearance procedures that specify when and how vegetation would be cleared with the view of minimising impacts on terrestrial flora and fauna;
- specific measures to manage conservation significant vertebrate fauna;
- progressive establishment of woodland/forest cover on the post-mine landforms;
- measures to prevent, monitor and control weeds and pests;
- measures to prevent and manage bushfire risk;
- various measures to manage other environmental factors (e.g. dust suppression, erosion and sediment control, water management); and
- a program to monitor the effectiveness of the management measures.

Progressive establishment of woodland/forest cover on the post-mine landforms would occur during operation of the mine and continue during decommissioning of the BNCOP. Impacts on terrestrial ecology during and after decommissioning would be minimised by progressive establishment of self-sustaining communities and ecosystems with diverse flora species composition and a complex community structure, providing successional habitat opportunities for fauna in the medium to long-term.

After taking into account the proposed impact avoidance and mitigation measures, there would still be some residual adverse impacts on terrestrial ecology values, but the residual impacts are unlikely to put at risk the conservation integrity of the wider populations of existing conservation significant species or vegetation communities. Notwithstanding, CCL has also committed to providing an offset strategy which addresses the residual adverse impacts and specifically benefits the vegetation communities/regional ecosystems that would be impacted by the BNCOP, particularly conservation significant Brigalow dominated communities.

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ATTACHMENT A

BARALABA NORTH CONTINUED OPERATIONS PROJECT - TERRESTRIAL ECOLOGY POST SUMMER AND POST WINTER BASELINE SURVEY REPORT (RPS Australia East, 2014)

Baralaba North Continued Operations Project

Terrestrial Ecology Post Summer and Post Winter Baseline Survey Report

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Version / Date: Rev 2/ March 2014

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Document Status

Version	Title and Purpose of Document	Orig	Review	Review Date
A	BNCOP Terrestrial Ecology Assessment - Draft report for review	MR	JW	8 November 2013
B	BNCOP Draft Terrestrial Ecology Assessment – Draft report for review	MR	JW/GG	25/26 November 2013
C	BNCOP Draft Baseline Terrestrial Ecology Assessment – Draft report for review	MR	JW/GG	18/20 December 2013
D	DRAFT BNCOP Terrestrial Ecology Post Summer and Winter Baseline Survey Report – Draft report for review	MR	JW/GG	16/17 January 2014
0	BNCOP Terrestrial Ecology Post Summer and Winter Baseline Survey Report – Final report for submission	MR	JW/GG	24 February 2014
1	BNCOP Terrestrial Ecology Post Summer and Winter Baseline Survey Report – Final report for submission	MR	JW/GG	5/6 March 2014
2	BNCOP Terrestrial Ecology Post Summer and Winter Baseline Survey Report – Final report for submission	MR	GG	28 March 2014

Approval for Final Issue

Name	Title	Signature	Date
Garry Gough	Project Director		28/03/2014

Contents

Tables

Figures

Appendices

1.0 Introduction

1.1 Project and Study Area Description

This survey report documents the terrestrial ecology in the area surrounding the approved Baralaba North/Wonbindi North Mine (ML80169 and ML80170) to inform the design of the Baralaba North Continued Operations Project (BNCOP) - an expansion of the existing/approved open cut coal mining. The terrestrial ecology study area (hereafter referred to as the 'study area') is located approximately 8 km north-west of the town of Baralaba (**Figure 1.1; Figure 1.2; Figure 1.3**).

The study area is located within the Brigalow Belt South Bioregion, Central Highlands Regional Council and Fitzroy River catchment area. The Dawson River traverses the eastern boundary of the study area and the Dawson River Anabranch occurs in southern sections of the study area (**Figure 1.3**). The study area includes, and is surrounded by, grazing properties with the existing Baralaba mine bordering to the south (**Figure 1.3**).

The study area's landform varies from alluvial channels, flats and terraces to gently undulating plains. The underlying geology consists of Quaternary alluvium and laterised Tertiary sandstone, siltstones and claystones. The majority of the study area is utilised for grazing and cultivation purposes and is predominantly cleared with only scattered patches and riparian corridors of native vegetation still remaining. Due to the diversity of the landform, geology and land use, the extant native vegetation is varied in both type and condition.

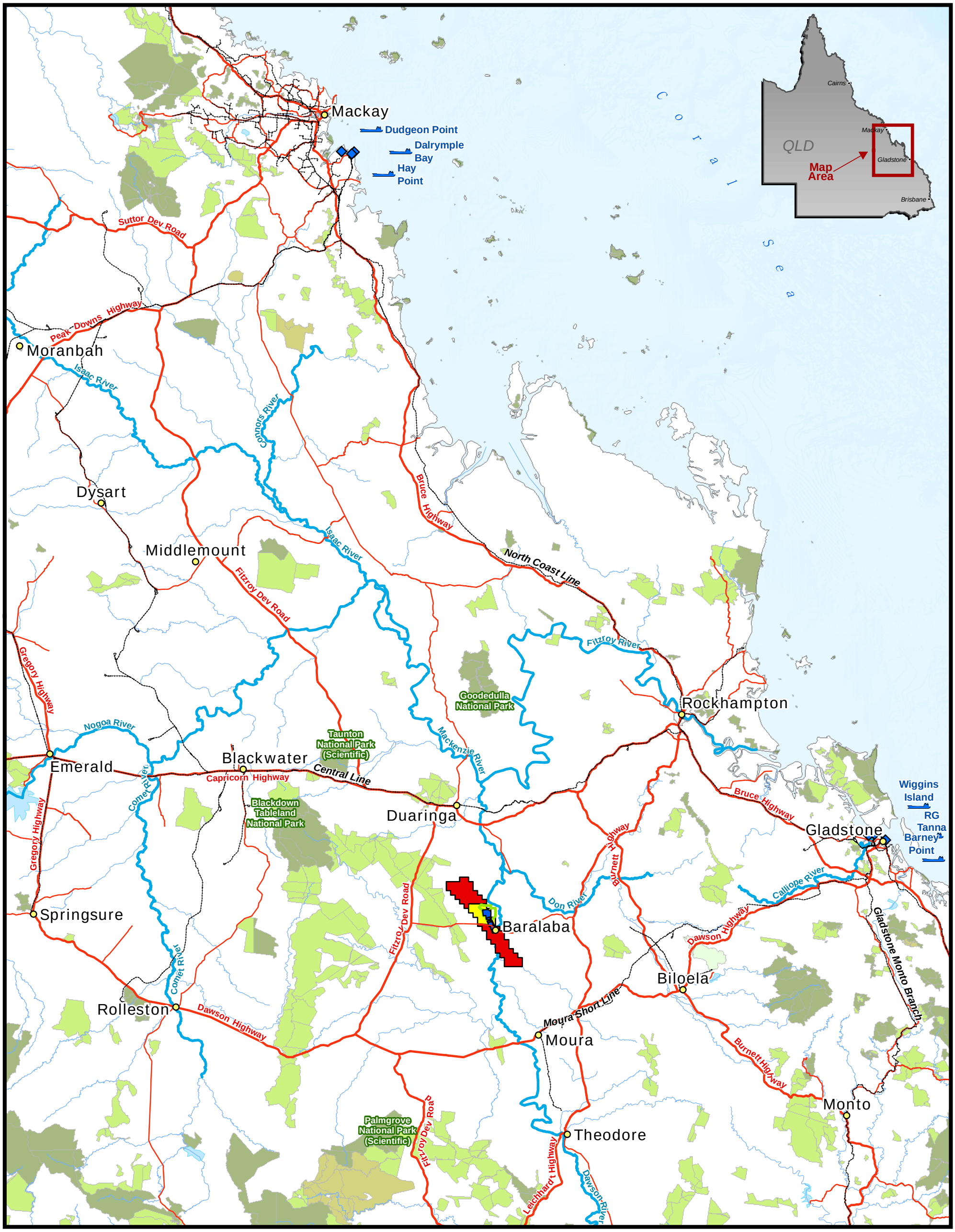
Existing infrastructure within the study area and project footprint includes farm dams, fencing, access tracks, irrigation infrastructure, cattle yards, transmission lines and residential houses.

1.2 Objectives and Scope of Works

The primary objective of this study was to provide an inventory of the terrestrial ecological values for the prescribed study area. This included seasonal (post winter [spring] and post summer [autumn]) terrestrial ecological surveys within the study area. Specifically, the scope for this assessment included:

- Desktop investigations to identify the potential ecological values present within and surrounding the study area, particularly values that are protected under State and Commonwealth legislation;
- Flora surveys within the study area to verify desktop results, including targeted searches for threatened flora species, weed infestations, as well as ground-truthing surveys to identify the location, extent and condition of native vegetation across the study area utilising the Regional Ecosystems framework and Threatened Ecological Communities criteria;
- Vertebrate fauna surveys within the study area to determine the fauna composition, in particular the actual or likely presence of threatened and migratory species, as well as to identify the location, extent and condition of fauna habitats, particularly breeding habitats, and pest species;
- Biodiversity assessment to identify areas of state, regional and local significance, including areas that contain special ecological values such as high endemism, corridor functions or that are ecologically sensitive i.e. waterways and wetlands; and
- Reporting, mapping and evaluating baseline results.

The scope of this report is to describe survey methods and survey results from the post summer (autumn) and post winter (spring) terrestrial ecology surveys.



PROJECT

BARALABA NORTH CONTINUED OPERATIONS PROJECT

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N

0 20 40 60

Kilometres

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Legend

Populated Place.....
Road.....
Rail.....
Watercourse.....
Cockatoo Coal ML.....
Cockatoo Coal MDL.....
Cockatoo Coal EPC.....
BNCOP Operational Land.....
Coal Terminal.....

Protected Areas

National Park
Forest Reserve
State Forest
Timber Reserve
Other

TITLE

Figure 1.1
Project Location

REV	DESCRIPTION	DATE
0	Original map output	19/03/14
1	Figure Update	02/04/14
2		

SCALE **1:1,500,000**
SIZE A3
DATUM GDA 94
PROJECTION

CURRENT ISSUE SIGNATURES

DRAWN	MJS
CHECKED	BJD
APPROVED	BJD

RPS

STATUS **FINAL**

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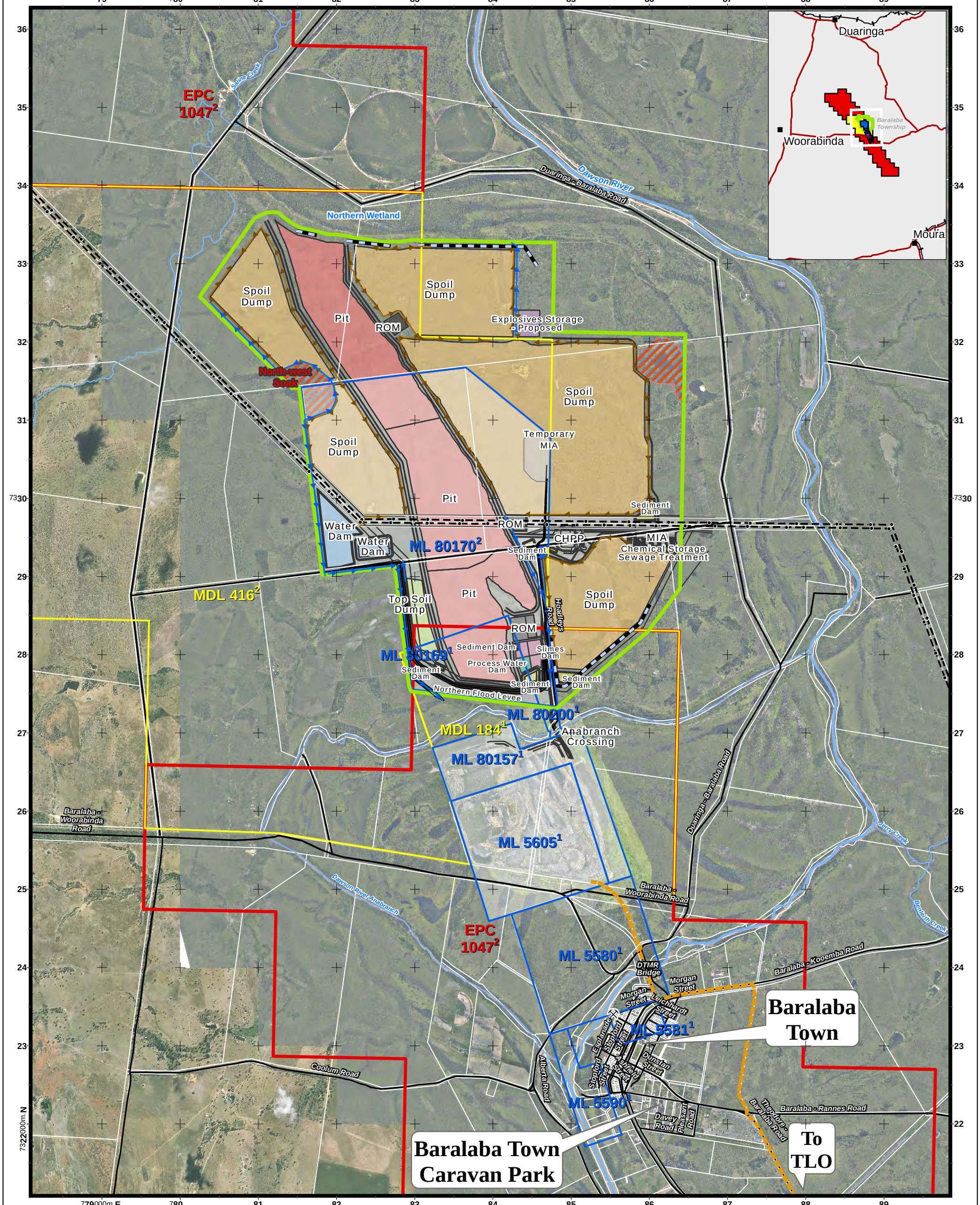

PROJECT **BARALABA NORTH CONTINUED OPERATIONS PROJECT**	DISCLAIMER: Cockatoo Coal Ltd has exercised all due care in the production of this map. Cockatoo Coal Ltd makes no warranty or representation to the client or third parties (expressed or implied) in respect to the information conveyed on this map, particularly with regard to any commercial investment decision made on the basis of this map. Use of this map by the client or third parties shall be at their own risk, and extracts from this map may only be published with the permission of Cockatoo Coal Ltd.			N 0 500 1,000 1,500 2,000 Metres	DATA SOURCES: VECTOR DATA: © DERM - LAND & PROPERTY DATA © GEOSCIENCE AUSTRALIA. *PUBLICLY ACCESSIBLE DATA HAS BEEN INCORPORATED INTO THIS MAP (ACCREDITED ABOVE). COCKATOO COAL PROVIDES NO WARRANTY TO THE ACCURACY, COMPLETENESS OR CURRENCY OF THIS DATA.*	*NOTE:* *¹: HELD BY BARALABA COAL PTY LTD* *²: HELD BY WONBINDI COAL PTY LTD*
TITLE **Figure 1.2** **Indicative Project Layout**	REV	DESCRIPTION	DATE	SCALE **1:45,000**	CURRENT ISSUE SIGNATURES	
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	1	Data & Text Updates	01/04/14	DATUM GDA 94	CHECKED	BJD
	2	Figure Update	02/04/14	PROJECTION MGA Zone 55	APPROVED	BJD

Legend

Road..... Watercourse..... Cadastre..... Cockatoo Coal ML..... Cockatoo Coal MDL..... Cockatoo Coal EPC..... Area of Exclusion of Mining Activities.....

Product Road Transport Route. Powerline & Power Pole..... BNCOP Operational Land..... Clean Water Drain..... Dirty Water Drain..... Proposed Flood/Erosion Protection Levee.....

RPS

STATUS **FINAL**

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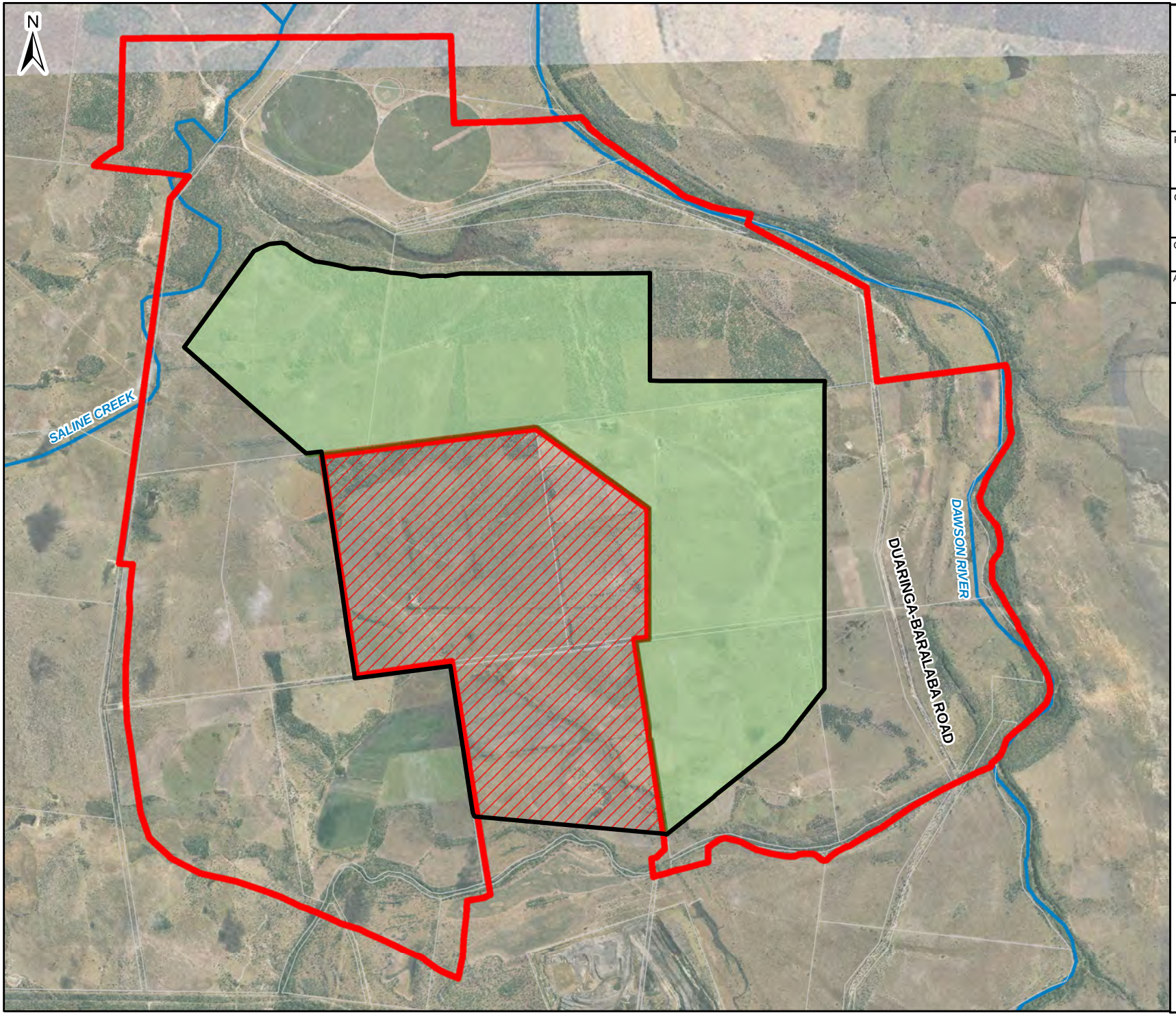


Terrestrial Ecology Study Area

Figure 1.3

Project:	Baralaba North Continued Operations Project
Client:	Cockatoo Coal Ltd
Compiled by: MR	Date: 26/11/2013
Approved by: GG	Date: 26/11/2013

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- BNCOP Operational Land
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

2.0 Methodology

The baseline terrestrial ecology assessment involved both desktop and field components. The field component consisted of a post summer survey (conducted between 12 and 21 April 2013 [autumn]) and a post winter survey (conducted between 19 and 29 October 2013 [spring]). The methodologies for both the desktop and field components are described in the sections below.

RPS undertook the ecological assessment using the following permits

- **Scientific Purposes Permit** issued by DEHP for conducting research on wildlife, including plants – Expires 23 February 2014;
- **Scientific Use** issued by Department of Agriculture, Fisheries and Forestry (DAFF) for using animals for a scientific purposes – Expires 25 March 2016; and
- **Animal Ethics Committee Approval** issued by DAFF to undertake baseline ecological studies– Expires 31 March 2016.

2.1 Desktop Assessment

The desktop component enabled the identification of potentially occurring species to ascertain known occurrences of species and subsequently enabled optimal design of specific survey methodologies. The desktop assessment involved reviewing relevant environmental documents, databases, maps and legislation (Commonwealth, State and Local) to identify potential species likely to be present and ecological values that may occur within the study area. The desktop assessment was based on the study area and a standard 10 km buffer. The following databases and maps were reviewed:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool, Commonwealth Department of Environment (DotE) (DotE, 2014) (**Appendix 1**);
- Queensland Department of Environment and Heritage Protection (DEHP) Wildlife Online records (DEHP, 2014a) (**Appendix 2**);
- Queensland Herbarium *HERBRECS* database (Queensland Herbarium, 2013);
- Queensland Museum Zoology Data Search (Queensland Museum, 2013);
- Atlas of living Australia (ALA) species search (ALA, 2013);
- Eremaea Birds species search (Eremaea Birds, 2013);
- Bird Data Bird Atlas Lists (Bird Data, 2013);
- Likelihood model maps in Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles (SEWPaC, 2011a);
- Queensland Department of Natural Resources and Mines (DNRM) Regulated Vegetation Management (RVM) Map and Supporting Map (DNRM, 2013a) (**Appendix 3**);
- Queensland DNRM Regional Ecosystem Map (RE Map) (Version 8.0) (DNRM, 2013b);
- Referable Wetland mapping (DEHP, 2013a);
- Environmentally Sensitive Area Map (DEHP, 2013b);
- Biodiversity Planning Assessment (BPA) mapping (BPA, 2008);
- Threatened Species High Quality Records (Queensland Herbarium, unpublished data);

- Previous Fauna Surveys for the Baralaba North Project Area (Footprints, 2012);
- DEHP Wetland Maps – Wetland Info (DEHP, 2014b);
- State Planning Policy (SPP) Interactive Mapping System (DSDIP, 2013);
- Baralaba 1:250,000 Geological Series Sheet (SG 55-4);
- Historical aerial photography supplied by DEHP; and
- Aerial photography supplied by Cockatoo Coal Pty Limited.

Preliminary vegetation and habitat mapping of the study area was also undertaken as part of the desktop assessment utilising the current RVM and RE mapping in conjunction with Aerial Photographic Interpretation (API). The preliminary vegetation and habitat map was used to stratify the study area into survey units, which are homogenous units defined by a unique RE and broad condition state (i.e. non-remnant, regrowth or remnant). This assisted in the field site selection process, and, to guide the required field survey effort.

The preliminary vegetation and habitat mapping along with the results of the desktop assessment, was also utilised to determine potentially occurring threatened species and ecological communities within the study area. Based on this information, the field survey methodology was developed to target these species and communities and determine their presence/absence within the study area (**Sections 2.2** and **2.3**).

2.2 Flora Survey

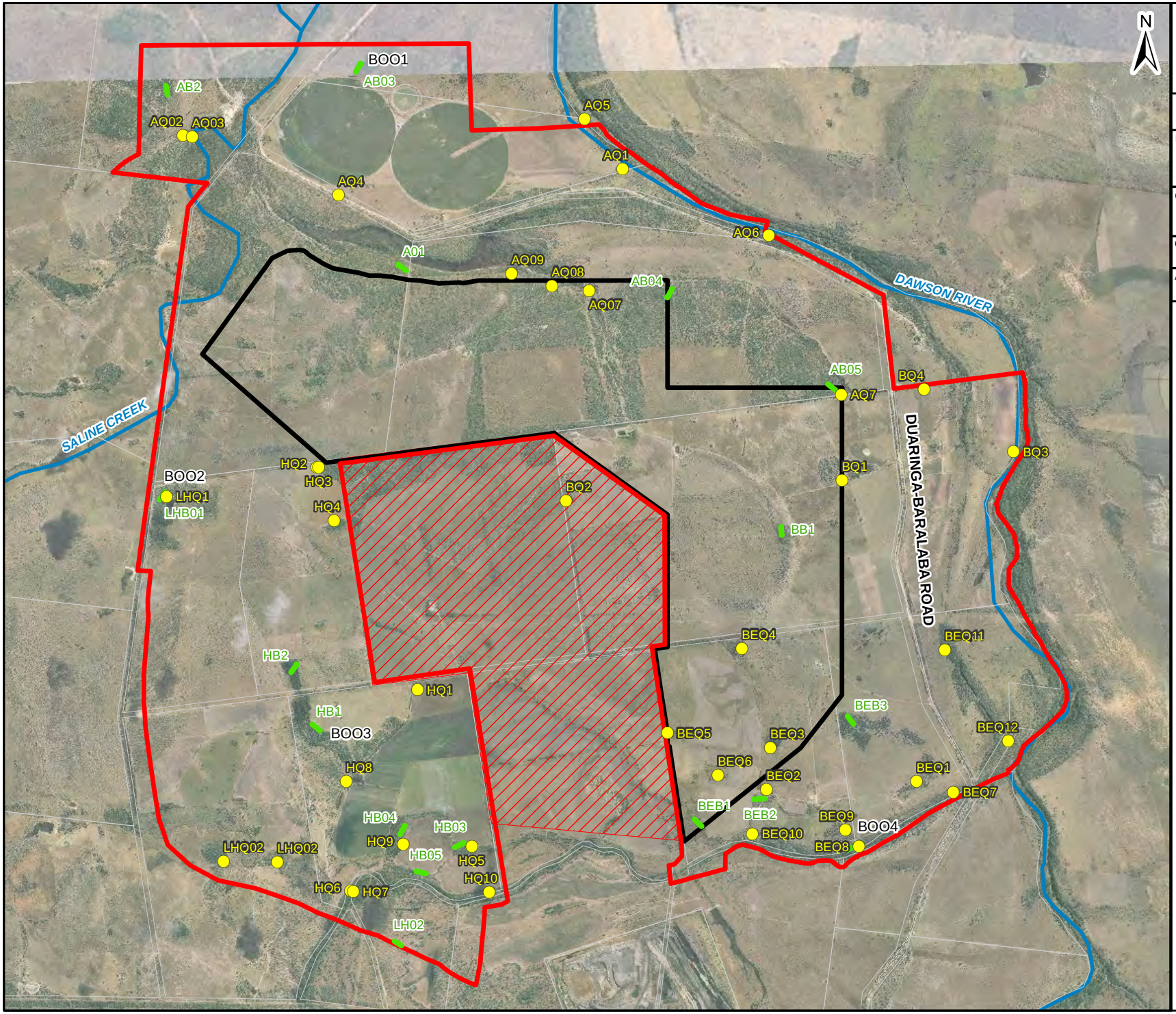
Flora surveys and assessments were undertaken across the study area to ground-truth the preliminary vegetation mapping as well as locate the presence of threatened flora species and weed infestations. Data on vegetation characteristics (floristic and structural form) and ecological condition of the vegetation communities, including RE and TEC classification were collected via three methodologies, namely tertiary surveys, quaternary surveys, and BioCondition assessment. Threatened flora species presence was determined using targeted searches in suitable habitats.

The flora survey was primarily conducted during the post summer survey period. Threatened flora species searches were conducted during both the spring and autumn surveys.

2.2.1 Tertiary and Quaternary Vegetation Surveys

Tertiary and quaternary vegetation surveys were undertaken in accordance with the methodologies outlined in Neldner *et al.* (2012). Tertiary surveys are more detailed than quaternary surveys and are primarily used to classify REs and vegetation communities. They involve compiling a comprehensive species list and collecting other detailed information, including vegetation structure and species abundance. Quaternary surveys involve rapid verification of the vegetation community and are primarily used to document field traverses and to inform vegetation mapping. This survey methodology is recognised as appropriate for vegetation mapping, field verification, community descriptions and providing flora inventories. The level of detail required for a secondary survey was not required in this study as its purpose was to classify REs rather than provide detailed descriptions. Additional information collected as part of a secondary survey would not have added value to the results.

In total, seventeen tertiary surveys were undertaken across the study area with at least one survey undertaken within each assessment unit (**Figure 2.1**). Assessment units were identified during preliminary vegetation mapping exercises and were refined during the field survey.



Flora Survey Locations

Figure 2.1

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	25/02/2014
Approved by:	GG	Date:	25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Survey Sites

- Quaternary Survey
- Tertiary/BioCondition Assessment

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

Tertiary

The 17 Tertiary survey sites consisted of 100 m x 50 m plots, which were located in areas that were representative of the assessment unit and at least 50 m from major disturbances, where patch size and shape permitted. Replicate tertiary surveys were undertaken where assessment units were geographically separated to ensure any spatial variation was recorded. Geographical locations from the central point of tertiary survey sites were taken using a Differential GPS Unit (Trimble).

The following data were collected:

- Structural form in accordance with the Specht Classification Systems (1970);
- Inventory of woody and non-woody species within each vegetation stratum;
- Identification of all dominant and common species within each vegetation stratum;
- Height range and average heights for each vegetation stratum present;
- Identification of RE and TEC classification;
- Landform patterns and soil characteristics;
- Notable disturbances (e.g. evidence of fire, erosion or logging); and
- Weed species.

Quaternary

Thirty-nine quaternary surveys were undertaken within replicate assessment units to validate classification and condition of the unit as well as maximise the spatial coverage of the field survey and data collected (**Figure 2.1**). This was done by comparing and confirming the detailed results collected in the tertiary surveys.

Data collected during the quaternary surveys was limited to the following vegetation characteristics:

- Structural form in accordance with the Specht Classification Systems (1970);
- Identification of all dominant and common species within each vegetation stratum;
- Height range and average heights for each vegetation stratum present;
- Identification of RE and TEC classification; and
- Notable disturbances.

All plant identifications for tertiary and quaternary surveys were carried out by experienced ecologists and/or botanists using local knowledge and available botanical reference material. Where necessary, specimens that were unable to be identified were sent to the Queensland Herbarium for verification.

RE classification was determined on the vegetation, soil and landform data collected in the field, as well as geological data for the Baralaba region and data from the Regional Ecosystem Description Database (REDD). TEC classification was determined using criteria listed in **Table 2.1**, as well as other assessment considerations. These criteria are for the targeted listed ecological communities identified in the desktop assessment and are in accordance with the following guidelines:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) Species Profile and Threats Database (DotE, 2013a);
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Information Sheet (SEWPaC, 2003);
- Approved Conservation Advice for Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions ecological community (SEWPaC, 2011b);

- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions Profile and Threats Database (DotE, 2013b); and
- Commonwealth Listing Advice for Weeping Myall Woodlands ecological community (SEWPaC, 2008).

Table 2.1: TEC Identification Criteria

Potential TEC	Identification Criteria
Brigalow (*Acacia harpophylla* dominant and co-dominant)	▪ Analogous to the 16 listed Brigalow Regional Ecosystems[1]; ▪ Patch size >0.5ha; and ▪ Patch age >15 years that retain species composition and structural elements typical of the listed Regional Ecosystems; and ▪ Coverage of exotic perennial plants <50%, assessed in a minimum area of 0.5ha; and ▪ Condition. Refer to DotE (2013a)
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	▪ *Eucalyptus coolabah* subsp. *coolabah* or *E .largiflorens* is present in the canopy layer (>50% of tree crown cover); and ▪ *Eucalyptus coolabah* subsp. *coolabah* or *E. largiflorens* canopy trees have a DBH >30cm, or are hollow-bearing, or coppiced trees with DBH >20cm; and ▪ Patch size >5ha; and ▪ Crown cover in patch >8%; and ▪ 10% or more of the ground cover comprise native graminoids, other herbs, chenopods, and / or native low shrubs; and ▪ Percentage of non-native perennial plant species does not exceed the percentage cover of native species in the ground layer. Refer to SEWPaC (2011b)
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	▪ Analogous to the 10 listed Semi-evergreen Vine Thicket Regional Ecosystems Refer to DotE (2013b)
Weeping Myall Woodlands	▪ *Acacia pendula* is present as the sole or dominant overstorey species (>50% of tree canopy cover or at least 25 dead or defoliated mature trees per ha); and ▪ Patch size >0.5ha; and ▪ Tree canopy must be dominated by living, dead or defoliated trees (≥ 50% of trees present) and; ▪ Patch has >2 layers of regenerating Weeping Myall trees present, or ▪ Tallest layer of living, dead or defoliated trees is ≥ 4m in height and ≥ 50% of the vegetative cover comprise native species. Refer to DEWHA (2009)

[1] This means that all 16 REs are considered to be the Brigalow TEC providing they meet the identification criteria.

2.2.2 BioCondition Assessment

Ecological condition was assessed at each tertiary site in accordance with the Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Version 2.1) (Eyre *et al.*, 2011), referred to as the BioCondition assessment methodology. This has been adopted by DEHP to assess vegetation and habitat condition across Queensland. BioCondition involves quantitatively assessing key attributes or surrogates of biodiversity values and ecosystem function against benchmark values of the same vegetation community to produce a numeric condition score. These data can be used to determine the ecological equivalence of clearing areas and proposed offset areas in accordance with the Ecological Equivalence Methodology Guideline (DEHP, 2011a).

BioCondition assessments were conducted within each assessment unit present within the study area, with a total of seventeen assessments being conducted (**Figure 2.1**). The assessment involved collecting data on

structural, functional and compositional aspects as listed in **Table 2.2** within the same 100 m x 50 m plot used for tertiary surveys.

Table 2.2: Summary of BioCondition Indicators (Eyre *et al.*, 2011)

Functions of Vegetation	Attributes Acting as Indicators of the Functions
Structural aspects ▪ Provision of reliable foraging resources for wildlife (e.g. nectar, leaves, seeds) ▪ Provision of reliable sheltering resources and or breeding study areas for wildlife	▪ Large trees ▪ Shrub cover ▪ Tree canopy cover ▪ Native perennial grass ▪ Coarse woody debris ▪ Organic leaf litter ▪ Ground Cover
Functional aspects ▪ Nutrient and water cycling ▪ Maintenance of soil condition ▪ Retention of plant propagules	▪ Tree canopy cover ▪ Native perennial non-grass cover ▪ Native perennial 'decreased' grass species basal area ▪ Coarse woody debris ▪ Organic leaf litter **Additional Features** ▪ Abundance of hollow bearing trees
Compositional aspects ▪ Maintenance of plant species diversity	▪ Native plant species richness ▪ Recruitment of canopy species ▪ Native perennial 'decreased' grass species basal area ▪ Exotic weed species cover (or lack of)
Landscape scale aspects ▪ Dispersal ▪ Functionality ▪ Edge Effects	▪ Connectivity ▪ Patch size ▪ Context

2.2.3 Targeted Threatened Species Searches

Targeted searches were undertaken to identify less common or threatened species within the study area. The desktop assessment (i.e. database searches for the study area and a 10 km buffer) identified one threatened flora species to potentially occur within the study area: Ooline (*Cadellia pentasylis*) (**Section 3.7**). Meander surveys were undertaken in an area of approximately 1ha surrounding or within each tertiary and quaternary survey site, as well as opportunistically across the study area in habitat considered suitable for this species.

2.3 Fauna Survey

2.3.1 Survey Summary

Two fauna surveys (post summer and post winter) were undertaken within the study area to determine the fauna composition and presence of threatened, migratory and non-native pest species and their habitats. Species presence and/or absence was determined through active searches, diurnal bird surveys, spotlighting, call play-back, bat detection, Koala Spot Assessment, and trapping (to target mammals, birds, reptiles and amphibians). Data on habitat characteristics (macrohabitat and microhabitat) and condition were collected using the BioCondition Assessment process (**Section 2.4.3**) and targeted habitat assessments.

Fauna survey sites were stratified across the study area according to ground-truthed assessment units identified in the flora survey. Consideration was also given to the macrohabitat and microhabitat preferences for potentially occurring threatened species within the study area. Selected sites included six fauna trapping sites that were sampled during both surveys. Other survey locations, e.g. for placement of harp traps/anabats,

active searches etc., varied between the two surveys (**Figure 2.2** and **Figure 2.3**). Spotlighting was undertaken at each fauna trapping site and within suitable habitat across the study area, as well as along tracks and roads.

Whilst the fauna survey was designed to detect as many fauna species within the study area as possible, it also included appropriate detection methods and survey effort for identifying target species listed under the EPBC Act or *Nature Conservation Act 1992* (NC Act). Target species for the fauna survey included threatened Brigalow reptile species, threatened bat species, the Koala (*Phascolarctos cinereus*), migratory bird species, threatened birds of prey and threatened woodland birds. **Table 2.3** provides a summary of the survey methods and effort used for targeted species. These are discussed further in the sections below. Field survey timing, the techniques used and expended effort are in accordance with the following guidelines, as well as being based on local knowledge and experience:

- Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles (SEWPaC, 2011a);
- EPBC Act Survey guidelines for Australia's Threatened Reptiles (SEWPaC, 2011c);
- EPBC Act Survey guidelines for Australia's Threatened Birds (SEWPaC, 2010a);
- EPBC Act Survey guidelines for Australia's Threatened Bats (SEWPaC, 2010b);
- EPBC Act Survey guidelines for Australia's Threatened Mammals (SEWPaC, 2011d);
- Interim Koala Referral Advice for Proponents (SEWPaC, 2012);
- Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre *et al*., 2012); and
- Targeted Species Survey Guidelines: Little Pied Bat (DSITIA, 2012).

A comparison between the recommended survey effort (outlined in the above documents) and the actual survey effort undertaken in the autumn and spring surveys is provided in **Table 2.3**. Survey methods and effort employed per stratification unit are presented in **Table 2.4**.

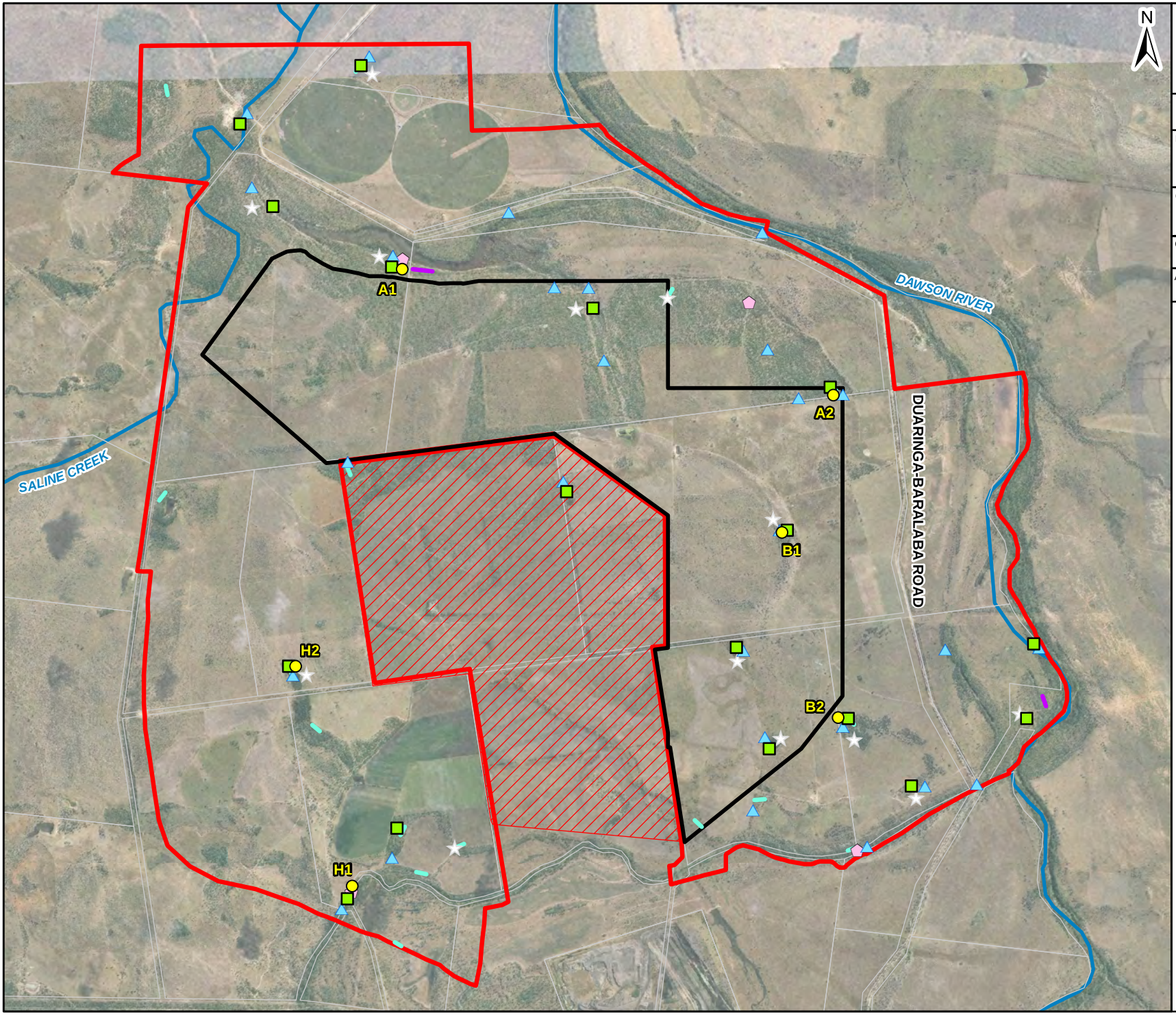
2.3.2 Active Searches

Active searches were undertaken to target potentially occurring threatened reptiles, as well as to identify additional species occurring within the study area (**Figure 2.2** and **Figure 2.3**). Suitable micro-habitat features such as dense leaf litter and fallen woody debris, rocky areas and crevices, hollow logs and burrows were targeted. Potential breeding and foraging habitat, as well as signs of animal occurrence (e.g. scats, tracks, bones, etc.), were also recorded.

Survey techniques included:

- Diurnal searches for sheltering or basking reptiles e.g. Yakka Skink (*Egernia rugosa*), Brigalow Scaly-foot (*Paradelma orientalis*) and Collared Delma(*Delma torquata*);
- Rock, log and debris rolling and raking; and
- Spotlight surveys for nocturnally active species e.g. Brigalow Scaly-foot, Dunmall's Snake (*Furina dunmalli*) and Ornamental Snake (*Denisonia maculata*).

A total of 41 hours (post summer survey) and 28.5 hours (post winter survey) of active diurnal searches were conducted within suitable habitat within the study area. Each detailed trapping site was searched for at least 30 person-minutes over two separate occasions. All other sites were searched for approximately 60 person-minutes over a single occasion. Spotlighting effort undertaken during this survey is discussed in **Section 2.3.4**.



Post Summer Fauna Survey Sites

Figure 2.2

Project:	Baralaba North Continued Operations Project
Client:	Cockatoo Coal Ltd
Compiled by: MR	Date: 25/02/2014
Approved by: GG	Date: 25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Fauna Survey Sites

- Trapping Site
- Active Search / Bird Survey
- Anabat / Songmeter
- Harp Trap
- Koala SAT Survey / Call playback

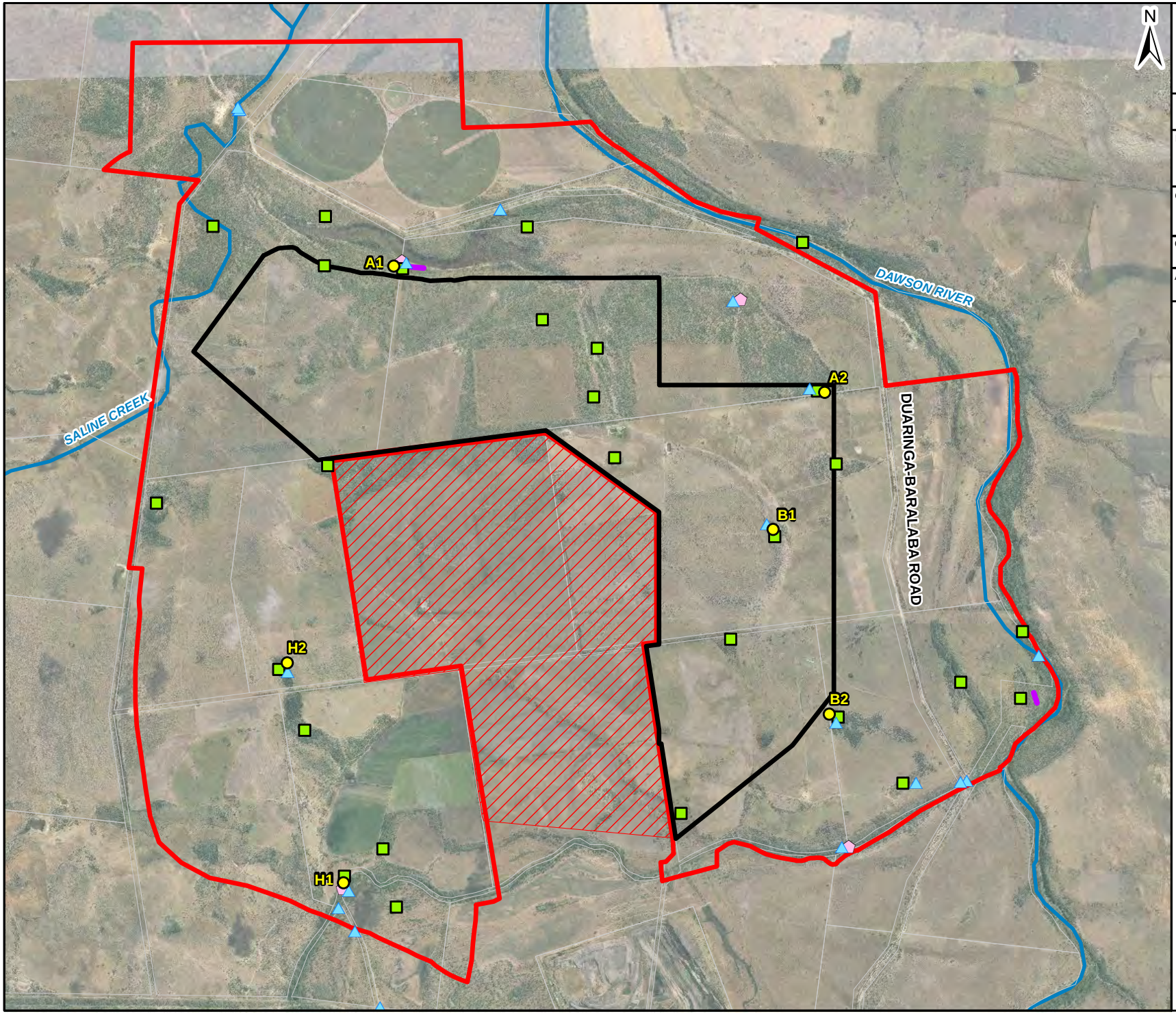
Fauna Habitat Sites

- Microhabitat Assessment
- BioCondition Assessment

0 0.5 1 2
Kilometres

Datum: GDA94

RPS



Post Winter Fauna Survey Locations

Figure 2.3

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	25/02/2014
Approved by:	GG	Date:	25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Fauna Survey Sites

- Trapping Site
- Habitat Assessment / Active Searches / Bird Survey
- Anabat/Songmeter
- Harp Trap
- Koala SAT Survey / Call playback

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

Table 2.3: Survey Methods and Effort Employed for Target Fauna Species Potentially Occurring within the Study Area

Species Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Survey Method	Recommended Survey Effort	Survey Effort	
						Post Summer	Post Winter
Birds							
Ephippiorhynchus asiaticus	Black-necked Stork	-	NT	▪ Diurnal bird surveys; and ▪ Searches for nests in suitable habitat (Eyre *et al*. 2012).	There are no published survey guidelines for Black-necked Stork.	31 hours over 9 days	28.5 hours over 10 days
Erythrotriorchis radiatus	Red Goshawk	V	E	▪ Diurnal bird surveys; and ▪ Searches for nests in suitable habitat (SEWPaC, 2010a).	80 hours over 10 days in areas > 50 ha (SEWPaC, 2010a).	31 hours over 9 days Habitat for this species, especially nesting habitat, is limited within the study area.	28.5 hours over 10 days Habitat for this species, especially nesting habitat, is limited within the study area.
Nettapus coromandelianus	Cotton Pygmy-goose	-	NT	▪ Diurnal bird surveys; and ▪ Searches for nests in suitable habitat (Eyre *et al*., 2012).	There are no published survey guidelines for Cotton Pygmy-goose.	31 hours over 9 days	28.5 hours over 10 days
Geophaps scripta scripta	Squatter pigeon (southern)	V	V	▪ Diurnal bird surveys (SEWPaC, 2010a).	15 hours over 3 days in areas < 50 ha SEWPaC, 2010a).	31 hours over 9 days	28.5 hours over 10 days
Melithreptus gularis	Black-chinned Honeyeater	-	NT	▪ Diurnal bird surveys; and ▪ Searches for nests in suitable habitat (Eyre *et al*., 2012).	There are no published survey guidelines for Black-chinned Honeyeater.	31 hours over 9 days	28.5 hours over 10 days
Neochmia ruficauda ruficauda	Star Finch (eastern), Star Finch (southern)	E	E	▪ Diurnal bird surveys (SEWPaC, 2010a).	15 hours over 5 days in areas < 50 ha, especially targeting waterholes (SEWPaC, 2010a).	31 hours over 9 days	28.5 hours over 10 days

Species Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Survey Method	Recommended Survey Effort	Survey Effort	
						Post Summer	Post Winter
Rostratula australis	Australian Painted Snipe	E	V	▪ Diurnal bird surveys (SEWPaC, 2010a).	10 hours over 5 days for areas < 50 ha when wetlands hold water but are not flooded (SEWPaC, 2010a).	31 hours over 9 days	28.5 hours over 10 days
Turnix melanogaster	Black-breasted Button-quail	V	V	▪ Diurnal bird surveys (SEWPaC, 2010a); and ▪ Searches for platelets in suitable habitat.	15 hours over 3 days (SEWPaC, 2010a).	31 hours over 9 days	28.5 hours over 10 days
Mammals							
Chalinolobus picatus	Little Pied Bat	-	NT	▪ Harp trapping; and ▪ Bat detection devices (SEWPaC, 2010b).	16 detector nights over 4 nights or 12 harp trap nights over 4 nights per 100ha of study area.	24 harp trap nights over six nights 27 acoustic detection nights. Approximately 1,000 ha within the study area is considered potential habitat for this species.	40 harp trap nights over seven nights 50 acoustic detection nights Approximately 1,000 ha within the study area is considered potential habitat for this species.
Dasyurus hallucatus	Northern Quoll	E	-	▪ Cage, Elliott and camera trapping; and ▪ Searches for latrines in suitable habitat (SEWPaC, 2011d).	Trap effort = 50 x extent of suitable ground-truthed habitat $(ha)^{0.5}$	No suitable habitat for Northern Quoll was ground-truthed within the study area. Nonetheless the following survey effort was undertaken: 60 Elliott B trap nights 30 cage trap nights 25 camera trap nights	No suitable habitat for Northern Quoll was ground-truthed within the study area. Nonetheless the following survey effort was undertaken: 216 Elliot B trap nights 24 cage trap nights 54 camera trap nights

Species Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Survey Method	Recommended Survey Effort	Survey Effort	
						Post Summer	Post Winter
Nyctophilus corbeni (South-eastern form)	South-eastern Long-eared Bat	V	-	▪ Harp trapping; and ▪ Bat detection devices (SEWPaC, 2010b).	20 Harp trap nights over 5 nights. This was calculated for an area <50 ha. There are no clear guidelines on how to scale this up for larger survey areas.	24 harp trap nights over six nights 27 acoustic detection nights Approximately 1,000 ha within the study area is considered potential habitat for this species.	40 harp trap nights over seven nights 50 acoustic detection nights Approximately 1,000 ha within the study area is considered potential habitat for this species.
Phascolarctos cinereus	Koala (combined populations of QLD, NSW & ACT)	V	-[2]	▪ Koala Spot Assessment (SEWPaC, 2012a); ▪ Call Playback; and ▪ Spotlighting.	Survey effort not stipulated	2 x 100m search transects 1 hour call play back 22 person hours of spotlighting	2 x 100m search transects 1 hour call play back 36 person hours of spotlighting
Reptiles							
Delma torquata	Collared Delma	V	V	▪ Active searches, including raking through leaf litter and turning rocks in suitable habitat; and ▪ Pitfall and funnel trapping (SEWPaC, 2011a).	No suitable habitat ground-truthed within the study area	41 hours active searches 22 person hours of spotlighting 648 Elliott A trap nights 72 Elliott B trap nights 182 pitfall trap nights 204 funnel trap nights	28.5 hours active searches 36 person hours of spotlighting 260 Elliot A trap nights 216 Elliot B trap nights 120 pitfall trap nights 148 funnel trap nights
Denisonia maculata	Ornamental Snake	V	V	▪ Active searches within suitable gilgai habitat; ▪ Spotlighting; and ▪ Pitfall and funnel trapping (SEWPaC, 2011a).	409 hours searches (active and spotlighting) 72 pitfall trap nights 24 funnel trap nights		

Species Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Survey Method	Recommended Survey Effort	Survey Effort	
						Post Summer	Post Winter
Egernia rugosa	Yakka Skink	V	V	▪ Active searches within suitable habitat; ▪ Searches for burrow systems and latrine sites; and ▪ Elliott trapping (SEWPaC, 2011a).	49 hours searches (active and spotlighting) 108 pitfall trap nights 36 funnel trap nights Elliott trap survey effort not stipulated		
Furina dunmalli	Dunmall's Snake	V	V	▪ Active searches; ▪ Spotlighting; and ▪ Pitfall and funnel trapping (SEWPaC, 2011a)	409 hours (active and spotlighting) 108 pitfall trap nights 36 funnel trap nights		
Paradelma orientalis	Brigalow Scaly-foot	-	V	▪ Active searches; ▪ Spotlighting; and ▪ Pitfall and funnel trapping (Eyre *et al*., 2012).	21hours (active and spotlighting) 72 pitfall trap nights 24 funnel trap nights		

[1]Status**:** E: 'Endangered', V: 'Vulnerable', NT: 'Near Threatened'.
[2] Koala is listed as 'Vulnerable' under the NC Act for the South-east Queensland Bioregion only.

Table 2.4: Survey Methods and Effort per Stratification Unit within the Study Area

Survey Method	Survey Effort per Stratification Unit					
	Riparian Woodland		Eucalypt Open-forest		Brigalow Woodland / Palustrine Wetland	
	Post Summer	Post Winter	Post Summer	Post Winter	Post Summer	Post Winter
Elliott A Traps	216 trap nights	96 trap nights	216 trap nights	80 trap nights	216 trap nights	84 trap nights
Elliott B Traps	24 trap nights	64 trap nights	24 trap nights	76 trap nights	24 trap nights	76 trap nights
Cage Traps	12 trap nights	8 trap nights	12 trap nights	8 trap nights	12 trap nights	8 trap nights
Pitfall Traps	60 trap nights	32 trap nights	60 trap nights	40 trap nights	72 trap nights	48 trap nights
Funnel Traps	72 trap nights	48 trap nights	72 trap nights	52 trap nights	72 trap nights	48 trap nights
Harp Traps	18 trap nights	27 trap nights	6 trap nights	13 trap nights	-	-
Bat Detection Devices	10 nights	31 nights	7 nights	10 nights	10 nights	9 nights
Motion Detection Cameras	10 nights	25 nights	10 nights	16 nights	5 nights	13 nights
Spotlighting	9 hours	13 hours	6 hours	15 hours	7 hours	8 hours
Diurnal Bird Surveys	12 hours	9 hours	8 hours	11.5 hours	11 hours	8 hours
Active Searches	16 hours	9 hours	16 hours	11.5 hours	9 hours	8 hours
Koala Spot Assessment	4 hours	4 hours	-	-	N/A	N/A

2.3.3 Diurnal Bird Surveys

Diurnal bird surveys were conducted each morning and afternoon across different habitat types to identify bird species occurring within the study area. Possible nest sites of threatened species were also identified. Opportunistic observations of birds were undertaken throughout the entire field survey. Birds were identified by direct observation or by recognition of calls. Excluding opportunistic observations, a total of 31 hours (post summer survey) and 28.5 hours (post winter survey) of active bird searches were undertaken within the study area. Each detailed trapping site was searched for at least 15 minutes over four separate occasions. All other sites were searched for approximately 60 person-minutes over a single occasion (**Figure 2.2** and **Figure 2.3**).

Nocturnal surveys, during spotlighting, were also undertaken to identify roosting diurnal birds, as discussed in **Section 2.3.4**.

2.3.4 Spotlighting

Spotlight searches for nocturnally active mammals, as well as birds and herpetofauna, including listening for fauna vocalisations, were carried out over six nights (post summer survey) and seven nights (post winter survey) throughout the study area (**Figure 2.2** and **Figure 2.3**).

Surveys commenced one hour after dusk and involved searching potential habitat from a slowly moving vehicle or on foot for approximately 1-2 hours. Areas with hollow bearing trees were targeted to detect arboreal mammals, forest owls and bats emerging from diurnal roosts to forage. These habitat features predominantly occurred along the Dawson River and associated tributaries, which were also targeted to detect Koalas. Aquatic/Gilgai habitats were also targeted to detect herpetofauna, particularly the threatened Brigalow Scaly-foot, Dunmall's Snake and Ornamental Snake (SEWPaC 2011b). Amphibians, mammals, reptiles and birds were identified by observation under spotlight or by vocalisations whilst spotlighting.

A total of 22 hours (post summer survey) and 36 hours (post winter survey) of spotlighting was conducted across the study area.

2.3.5 Bat Detection

Harp traps and acoustic bat detection devices were used in suitable locations/habitats to determine the presence/absence and species distribution of bats within the study area (**Figure 2.2** and **Figure 2.3**).

Two harp traps were placed per flyway for the post summer season survey, while three harp traps were placed per flyway for the post winter survey. A total of four flyways were sampled per survey in total, with two flyways sampled during the first half of the surveys and another two flyways sampled during the second half of the surveys. The increase in harp traps for the post winter survey was due to the potential for South-eastern Long-eared Bat (*Nyctophilus corbeni*) to occur and the enhanced capture opportunity for this species (Ford, pers. comm.). This species was specifically targeted with harp traps as it was identified by anabat call data during the post summer assessment, as potentially occurring, but not confirmed.

Positioning of harp traps focussed on natural flyways below the canopy which typically provide an abundance of microbat foraging resources (insects). Traps were set before dusk and checked early evening and again early morning when they were closed. Harp traps were set for a total of 24 trap nights during the post summer survey and 40 trap nights during the post winter survey.

Anabat SD2 detection units and Song Meters SM2 were also placed in suitable flyways within different habitats across the study area. The Anabats/Song Meters were set before dusk and retrieved each morning after sunrise. The number of devices set each survey night varied, but in total 27 (post summer survey) and

50 (post winter survey) trap nights were undertaken within the study area (note that one trap night is defined as one night for which one trap is set).

2.3.6 Koala Transects and Spot Assessment Technique

Two 100m transects were established within suitable habitat to determine the potential presence of Koalas within the study area (**Figure 2.2** and **Figure 2.3**). During both the post summer and post winter survey, each transect was traversed by four ecologists spaced at a distance of 10 m apart to search for Koalas or evidence of their occurrence (i.e. scats or scratches). One centrally positioned person navigated the transect using a GPS and compass to ensure accurate surveying.

The Spot assessment Technique (SAT) is applied if Koalas (or evidence of Koalas) are identified within surveyed transects. This technique indicates how frequently an area of habitat is utilised by Koalas, providing a measure of Koala activity and an indication of habitat importance (SEWPaC, 2012a). The technique involves identifying a centre tree according to the following criteria (in decreasing priority):

- A tree of any species where one or more Koala faecal pellets have been observed; and/or
- A tree in which a Koala has been observed; and/or,
- Any other tree known or considered to be potentially important for Koalas.

Upon identifying the centre tree, thirty surrounding trees are sampled (trees = >100 mm DBH) by undertaking a systematic search for faecal pellets. A SAT score is assigned based on the percentage of trees identified as having evidence of Koalas.

As no Koalas were identified (**Section 4.3**), the SAT assessment was not applied.

2.3.7 Call Playback

Call playback sessions were undertaken during spotlighting surveys to potentially detect Koalas within the study area within suitable habitat along the Dawson River and palustrine wetland (associated with the relict drainage line of the Dawson River) to the north (**Figure 2.2** and **Figure 2.3**). Each session began with a minimum five minute listening period, followed by the broadcasting of pre-recorded calls of Koalas. Calls were played for three minutes, followed by a two minute listening period. In total, one hour of call playback assessment was undertaken during both the post summer and post winter surveys.

2.3.8 Terrestrial Trapping

Terrestrial trapping was undertaken over a four to six night period at six survey sites within the study area (**Figure 2.2** and **Figure 2.3**). Where sites permitted, traps were established according to the standard vertebrate survey site layout recommended by Eyre *et al*. (2012). At each site, four to six 20 L pitfall buckets were placed along 30 m of drift fence. Five to eight funnels were set up at regular intervals on alternating sides of the drift fence and 20 Elliott traps (included Elliot A and B traps set at varying ratios per site) were set at 5-10 m intervals along two 100 m transects adjacent to the drift fence. One cage trap was set at a suitable location (i.e. flanking a log) near the pitfall line. In addition, one to two baited motion detection cameras were installed at almost all sites for the duration of the survey.

Elliott traps were baited with a mixture of oats, sardines, honey, fruit and boiled egg, while cage and camera traps were baited with chicken wings and fruit. Traps were checked early morning and late afternoon, with any captures identified and released at the point of capture. Traps were re-baited where necessary.

The number of traps per site is presented in **Table 2.5.**

Table 2.5: Number of Traps per Site during the Post Summer and Post Winter Surveys

Site*	Number of Traps per Site					
	Elliott A Traps	Elliott B Traps	Cage Traps	Pitfall Traps	Funnel Traps	Motion Detection Cameras
Post Summer Survey						
A1	18	2	1	6	6	1
A2	18	2	1	4	6	1
B1	18	2	1	6	6	1
B2	18	2	1	6	6	0
H1	18	2	1	4	6	1
H2	18	2	1	6	6	1
Total Trap Nights	**648**	**72**	**36**	**192**	**216**	**30**
Post Winter Survey						
A1	12	8	1	4	6	2
A2	10	10	1	4	5	2
B1	10	9	1	6	8	2
B2	11	9	1	6	6	2
H1	12	8	1	4	6	2
H2	10	10	1	6	6	2
Total Trap Nights	**260**	**216**	**24**	**120**	**148**	**48**

*Site locations are shown in **Figure 2.2** and **Figure 2.3.**

2.3.9 Habitat Assessment

Habitat assessments were undertaken across the study area, targeting habitat of threatened species. These assessments were undertaken using multiple 10 m x 10 m quadrats in which the following habitat features were recorded:

- Type and condition of vegetation;
- Dominant tree species and canopy cover;
- Presence/absence of large remnant trees;
- Density, size and height of hollows in trees and/or stags;
- Density of fallen logs, hollowed stumps and/or stags;
- Abundance of woody debris;
- Presence/absence of decorticating bark;
- Density and description of groundcovers, including litter, tussocks, logs; rocks and cryptograms;
- Presence/absence of rocks, caves, boulders etc;
- Description of gilgai, where present;
- Types and level of disturbances;
- Burrow abundance (number of burrows per quadrat);
- Description of soil;
- Proximity to and description of closest water source; and

- Habitat patch size and connectivity.

Habitat assessment locations for the post summer and winter surveys are presented in **Figure 2.2** and **Figure 2.3**, respectively. Information on habitat quality was also collected using BioCondition assessments (**Section 2.4.3**).

2.4 Data Analysis

2.4.1 GIS Analysis

Spatial data collected during the field survey was imported into ArcView GIS (Version 10) to be analysed with the data obtained from the preliminary mapping exercise. Vegetation community and habitat boundaries were refined using the collected spatial data and general observation made during the assessments. The ground-truthed extent of vegetation communities and habitat types, including associated REs and listed ecological communities were then mapped in GIS.

2.4.2 Bat Call Analysis

Analysis of all bat calls collected during the survey period was undertaken by Greg Ford, a qualified specialist. Call identification was based on comparisons with published call descriptions (Reinhold *et al.,* 2001; Pennay *et al.,* 2004) and with reference calls collected from central and southern Queensland (Ford, 2013a). Determination of species' identification was further refined by considering probability of occurrence based on species distribution data [Churchill (2008) and Van Dyck and Strahan (2008)], and/or database information obtained from ALA, 2013 and DEHP, 2014.

The format and content of the analysis summary reports complies with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon, 2003).

2.4.3 BioCondition Analysis

Site-based attribute data collected during BioCondition assessments for each assessment unit were analysed against the corresponding benchmark data provided by DEHP. Benchmarks are quantitative values for each attribute within the BioCondition assessment and are based on the average or median values of a mature and generally undisturbed 'reference' site (Eyre *et al*., 2011). Benchmarks are used as a baseline to compare and thus score the relative condition of an assessed site (i.e. act as a reference point for comparison). Site-based attribute data for each assessment unit were analysed against available benchmark data in accordance with the scoring system provided in the Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Version 2.1) (Eyre *et al*., 2011).

BioCondition analysis of attribute data collected across the study area utilised DEHP published benchmark data for RE11.3.1, RE11.3.2 and RE11.3.4, and applicable data from the DEHP published technical description for RE11.4.8. BioCondition attributes not included in the technical descriptions for RE11.4.8 (i.e. coarse woody debris) were analysed against benchmark data from final 'Best On Offer (BOO) sites (**Figure 2.1).** BioCondition benchmarks or technical descriptions were not available for RE11.3.3, RE11.3.27i, RE11.4.8a, RE11.5.5 and RE11.5.9. As such, these REs were analysed against either BioCondition data or technical descriptions of an RE in the same broad vegetation group, or against BOO sites within the study area (**Appendix 4**).

In addition to field collected site-based attribute data, landscape-scale attributes of each assessment unit within the study area were assessed in ArcGIS in accordance with the methodology and scoring system outlined in the Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Version 2.1) (Eyre *et al*., 2011). Current RE and regrowth mapping data were utilised to assess connectivity and context landscape-scale attributes.

The overall BioCondition score (site-based attribute and landscape-scale attribute score) is divided into a four-tiered scoring system, which determines the final conditional class of the area. BioCondition class one (overall score >80%) represents an area with minimal disturbances and in the best condition for that vegetation type (BOO) and BioCondition class four (overall score <40%) represents an area that is highly degraded, modified and in the worst condition for that vegetation type (referred to as 'Worst On Offer').

2.4.4 Species Accumulation Curves

For the post summer season survey species accumulation curves were determined for each taxonomic group to assess the adequacy of the survey effort (**Appendix 5**). Species accumulation curves assessed species richness against number of survey days / nights. The number of days / nights was assessed in place of the number of sites, due to the combination of survey techniques used in the survey design resulting in sites with varying survey effort. However, the amount of survey effort across the study area per day was generally consistent, thus providing a constant measure of survey effort through time.

For the post winter season survey, the survey effort was redesigned to target certain species considered possible (following the analysis of the post summer survey data and expert knowledge of the study area) and as such, species accumulation curves are only appropriate for avifauna. The survey redesign allowed for targeting (increased harp trapping) South-eastern Long-eared Bat, Koala and threatened reptiles (through spotlighting and target active searches in potentially suitable habitat).

During the post winter survey, three sites were sampled for a four night period, immediately followed by the remaining three sites. This allowed for an eight night survey period, rather than a six night period as per the post summer survey, in which all six survey sites were sampled over the same time period. The post winter survey was designed to meet all guidelines for targeting threatened species (previously discussed in **Section 2.3**), while also allowing for increased effort using other survey techniques (i.e. harp trapping and spotlighting).

2.5 Survey Conditions and Limitations

Weather conditions recorded at the nearest weather station to the study area (the Thangool Airport weather station) for each day during the two survey periods are presented in **Table 2.6** and **Table 2.7**. The Thangool Airport is located approximately 85 km to the south-east of study area.

Table 2.6: Daily Weather Conditions for Thangool Airport during the Post Summer Survey

Parameter	April	15/04	16/04	17/04	18/04	19/04	20/04	21/04
Daily Rainfall (ml)	3.2	0	0	0	0	0	0	0
Max Temp (^{0}C)	28.8	28.8	28.8	30.9	29.1	29.8	27.0	28.0
Min Temp (^{0}C)	17.6	16.2	14.7	14.3	15.1	14.1	11.3	6.6

Source: Weatherzone (2013)

Table 2.7: Daily Weather Conditions for Thangool Airport during the Post Winter Survey

Parameter	October	19/10	20/10	21/10	22/10	23/10	24/10	25/10	26/10	27/10	28/10
Daily Rainfall (ml)	0.5	0.4	0	0	0	0	0	0	0	0	0
Max Temp (^{0}C)	32.4	31.9	32.6	33.4	33.5	33.4	35.0	31.4	32.7	33.1	32.9
Min Temp (^{0}C)	12.9	15.7	12.5	11.6	11.6	11.6	13.2	17.1	13.3	13.5	15.0

Source: Weatherzone (2013)

Fauna

The moderate nights noted early in the week during the post summer survey, provided for appropriate survey conditions for amphibians and other nocturnal species, while the dry hot days throughout the survey period provided good conditions for diurnal reptiles and birds. Dry conditions prior to, and during the post winter survey, provided poor conditions for detecting most faunal groups, especially frogs and waterbirds. However, moderate night-time temperatures provided appropriate survey conditions for nocturnal species.

All surveys are subject to inherent limitations in the detection success of targeted species. These limitations often result in a degree of false-absence records (i.e. a species is present, but not detected). It is important, therefore, that the limitations to surveys are identified and the survey results are viewed with these constraints in mind.

The general limitations to the fauna survey conducted in the study area may include the following:

- Species with large home ranges (e.g. owls and raptors) may not be present in this part of their home range during the survey period;
- The difficulty in detecting certain species during the survey period (e.g. cryptic species, species present in the study area at very low densities, and trap-shy species);
- Biological factors such as sex, age-class, and breeding biology, which may influence species' habitat use and detectability during different times of the year; and
- The lack of suitable flyways for harp trap surveys, which reduced the effectiveness of this trapping technique within the study area.

In response to the above mentioned limitations a detailed trapping program conducted over two seasons with a suitable survey effort was designed to maximise opportunities of detecting target species. For species not detected, habitat assessments were undertaken and expert knowledge considered to determine the value of the study area for supporting these species i.e. absence of a species was not assumed because it was not detected.

Flora

The detectability and the ability to accurately identify plants to species level may vary greatly with the time of year, prevailing climatic conditions and the presence of reproductive material (e.g. flowers, fruit, and seed capsules). Consequently, the survey conducted for the study area should not be regarded as conclusive evidence that certain listed threatened flora species do not occur within the study area. However conditions proceeding, and at the time of the post summer survey (i.e. high temperatures and periodic rainfall), which is when the majority of flora work was conducted, are considered to be conducive to plant growth, seeding and fruiting. The post summer survey was therefore conducted at an ideal time for detecting the majority of flora species. In addition, seasonal variability was accounted for by conducting a second survey for threatened species during the post winter survey period.

3.0 Flora Survey Results

3.1 Overview

The DNRM Regulated Vegetation Management Map (**Appendix 3**) identifies Category B (remnant vegetation), C (HVR) and X (vegetation not regulated under the VM Act) areas to occur within the study area. Category B areas are mapped as comprising seven REs, including three with a Biodiversity (BD) Status of 'Endangered' and four with a BD status of 'Of Concern' (**Section 3.3**).

Ground-truthing activities within the study area identified 17 vegetation communities to occur in varying condition. These vegetation communities were made up of nine REs including three with a BD status of 'Endangered', five with a BD status of 'Of Concern' and three with a BD status of 'No Concern at Present'. Several discrepancies were found between the type and extent of DNRM mapped and verified REs (**Section 3.4**).

Results of the EPBC Act Protected Matters Search Tool identified three Threatened Ecological Communities (TECs) (**Section 3.6**) and one threatened flora species, Ooline (*Cadellia pentasylis*) (**Section 3.7**) to potentially occur within the study area. Field investigations identified no threatened species, but two TECs were identified: 1) Coolibah – Black Box Woodlands of the Darling Riverine Plains & the Brigalow Belt South Bioregions and 2) Brigalow (*Acacia harpophylla* dominant & co-dominant) (**Section 3.6**). Three Weeds of National Significance (WoNS) were also ground-truthed to occur in low abundance across the study area (**Section 3.5).**

The existing floristic values within the study area are listed in the following sections. A summary of values identified in both the desktop assessment and the field survey are outlined in **Table 3.1**.

Table 3.1: Summary of Existing Floristic Values within the Study Area

Database/Reference	Results		Report Section
	Desktop	Field Verified	
Environmentally Sensitive Areas (ESAs) (DEHP, 2013b) State Planning Policy (DSDIP, 2013)	43 ha of Category B[1] ('Endangered' Regional Ecosystems) ESAs mapped. Category C[1] ESAs including 'Regulated' vegetation, palustrine and riverine wetlands and 'Wildlife Habitat'.	49 ha of Category B ('Endangered' Regional Ecosystems) ESAs ground-truthed. Category C ESAs ground-truthed to occur, including 1072 ha Category C 'Regulated' Vegetation.	Sections 3.2 & 3.4
DNRM Regulated Vegetation Management Mapping (DNRM, 2013a)	Category B, C and X areas[2] identified within the study area.	No field verification required.	Section 3.3
DNRM RE Mapping, Version 8.0 (DNRM, 2013b)	43 ha of 'Endangered' RE and 821 ha of 'Of Concern' RE[2]	49 ha of 'Endangered' RE, 731 ha of 'Of Concern' RE and 341 ha of 'No Concern at Present' RE areas ground-truthed[2].	Sections 3.3.1 and 3.4
Wildlife Online (DEHP, 2014) EPBC Act Protected Matters Report (DotE, 2014)	Nine Weeds of National Significance (WoNS) have potential to occur in the site locale (10 km).	Four weeds declared under the LP Act, including three also listed as WoNS were recorded.	Section 3.5
EPBC Act Protected Matters Report (DotE, 2014)	Four TECs listed under the EPBC Act potentially occur within the site locale (10km buffer): ▪ Brigalow (*Acacia harpophylla* dominant & co-dominant) ▪ Semi-evergreen vine thickets of	Two of the four TECs ground-truthed, including Brigalow (*Acacia harpophylla* dominant and co-dominant), and Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions.	Section 3.6

Database/Reference	Results		Report
	the Brigalow Belt (North/South) & Nandewar Bioregions ▪ Coolibah – Black Box Woodlands of the Darling Riverine Plains & the Brigalow Belt South Bioregions ▪ Weeping Myall Woodlands		
Wildlife Online (DEHP, 2014) HERBRECS (Queensland Herbarium 2013) EPBC Act Protected Matters Report (DotE, 2014)	One threatened flora species listed under the NC Act and EPBC Act has the potential to occur in the site locale (10km buffer).	No NC Act or EPBC Act listed flora species were identified during the survey.	Section 3.7
DNRM Regulated Vegetation Management Mapping (DNRM, 2013a)	No 'Essential Habitat' for threatened flora species mapped.	N/A. No threatened flora species were identified during the survey.	Section 3.7.3

[1] Category B and C ESAs are defined in **Section 3.2**.
[2]Category B area = remnant vegetation; Category C area = High Value Regrowth; Catogroy X area = Vegetation not regulated under the VM Act.
[2] REs are presented with their Biodiversity Status (BD Status).

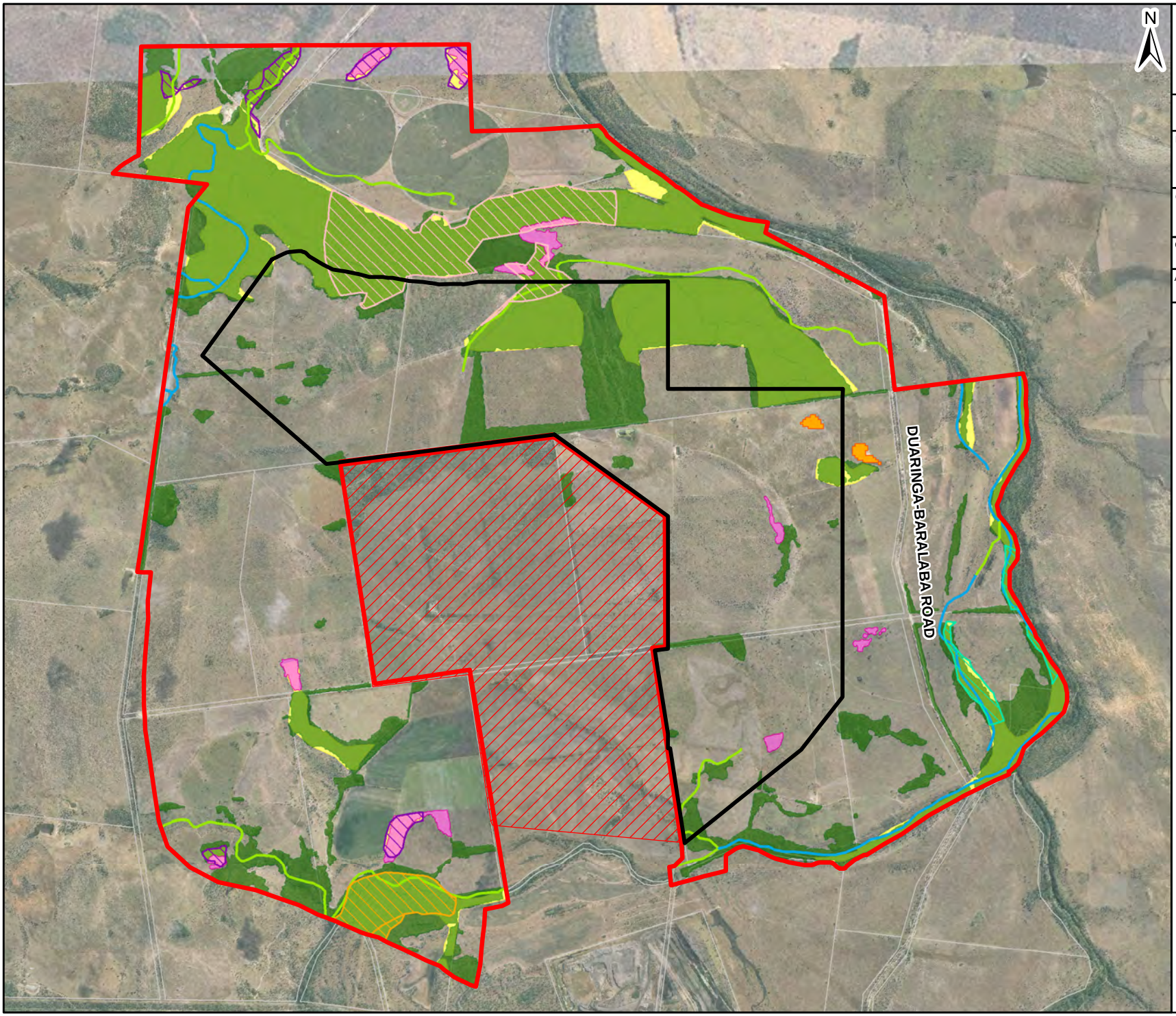
3.2 Environmentally Sensitive Areas

Category A, B and C Environmentally Sensitive Areas (ESAs) relevant to mining projects are listed under Section 25 and 26 of *the Environmental Protection Regulations 2008* as well as in Appendix A of the Code of Environmental Compliance for Mining Lease Projects (DEHP, 2013c).

The DEHP ESA Map (DEHP, 2013b) identifies small areas of Category B ('Endangered' Regional Ecosystems) ESAs across the study area. In total 43 ha of Category B ('Endangered' Regional Ecosystems) ESAs have been mapped (**Figure 3.1**). The occurrence of Category B ('Endangered' Regional Ecosystems) ESAs was verified during the field survey with approximately 49 ha ground-truthed within the study area (**Figure 3.1**). Vegetation communities recorded during the field assessment that qualify as Category B ('Endangered' REs) ESAs are discussed further in **Section 3.4**.

According to Appendix A of the Code of Environmental Compliance for Mining Lease Projects (DEHP, 2013c), Category C ESAs include '*an area subject to a State Planning Policy that the policy declares is in need of environmental protection'*. These areas are not necessarily mapped on the DEHP ESA Map (DEHP, 2013b). The SPP protects a number of areas which can be considered Category C ESAs as per the above definition. These areas are mapped on the SPP Interactive Mapping System (DSDIP, 2013) and are presented in **Figure 3.1.** They include the following:

- 'Regulated' Vegetation (except that classified as Category B ESA i.e. 'Endangered' RE);
- Riverine Wetlands associated with the Dawson River;
- Palustrine Wetlands; and
- Wildlife Habitat.
- A total of 821 ha of Category C 'Regulated' vegetation is mapped within the study area. The field survey ground-truthed the extent of Category C vegetation to be higher than that mapped (approximately 1072 ha).
- 'Wildlife Habitat' includes areas of 'Essential Habitat' for Brigalow Scaly-foot and Squatter Pigeon (*Geophaps scripta scripta*) (**Section 4.4.3**), as well as protected habitat for Short-beaked Echidna (*Tachyglossus aculeatus*), a species protected as a special 'Least Concern' species under the NC Act.



DEHP Mapped and Ground-truthed Environmentally Sensitive Areas

Figure 3.1

Project:	Baralaba North Continued Operations Project
Client:	Cockatoo Coal Ltd
Compiled by: MR	Date: 25/02/2014
Approved by: GG	Date: 25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.
DEHP ESA Map (2013b)
DSDIP SPP Interactive Map (2013)

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan

Envrionmentally Sensitive Areas

Category B

- DEHP Mapped Endangered REs
- Ground-truthed Endangered REs

Category C

- DEHP Mapped Regulated Vegetation
- Ground-truthed Regulated Vegetation
- Regulated Vegetation (intersecting a watercourse)
- Riverine Wetland
- Palustrine Wetland

Wildlife Habitat

- Brigalow Scaly-Foot
- Squatter Pigeon
- Echidna

0 0.5 1 2
Kilometres

Datum: GDA94

RPS

3.3 Regulated Vegetation

The DNRM 'Regulated' Vegetation Management Map (**Appendix 3**) identifies Category B, C and X areas to occur within the study area (**Figure 3.2**). The majority of the study area comprises Category X area, which is defined as vegetation that is not regulated under the VM Act. Some small patches of Category B area, defined as High-value Regrowth, are mapped in the northern and southern portions. Under the VM Act, clearing of High-value Regrowth is no longer regulated (as of 2 December 2013) except for on leasehold land used for agriculture and grazing purposes. Category B areas (Remnant Vegetation) are discussed in **Section 3.3.1**.

The ground-truthed vegetation results discussed in this report include areas that are currently "locked-in" as Category C and Category X areas as per the DNRM Regulated Vegetation Management Map.

3.3.1 Remnant Vegetation

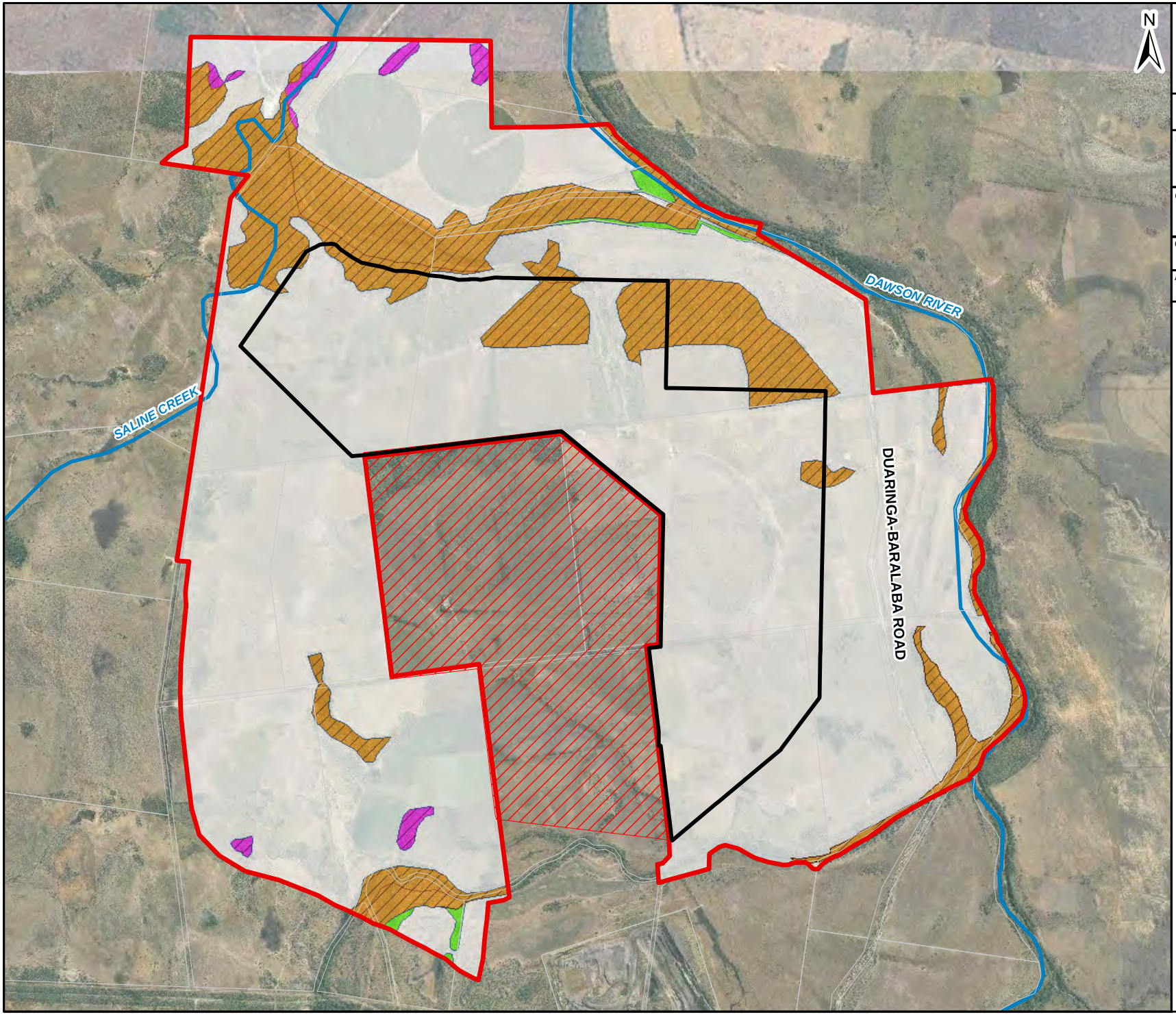
The DNRM Regulated Vegetation Management Map and Supporting Map (**Appendix 3**) identifies that 864 ha of remnant vegetation occurs within the study area (**Figure 3.2**). This vegetation is comprised of seven REs and comprises approximately 43 ha of remnant vegetation with a BD Status of 'Endangered' and 821 ha of remnant vegetation with a BD Status of 'Of Concern'. No remnant vegetation with a 'No Concern at Present' status is mapped by DNRM within the study area. **Table 3.2** provides a description, outlines the VM Act and Biodiversity (BD) Status and provides an extent for all REs mapped by DNRM or ground-truthed to occur within the study area.

Ground-truthing of the RE mapping across the study area revealed numerous inaccuracies in the extent of remnant vegetation as well as in the identification and classification of RE types. Field surveys revealed a greater extent of remnant vegetation within the study area compared to the DEHP mapping with a total of 1121 ha ground-truthed. This equates to an additional 257 ha of remnant vegetation than what is currently mapped. Ground-truthed remnant vegetation within the study area comprises approximately 49 ha of remnant vegetation with a BD Status of 'Endangered', 731 ha of remnant vegetation with a BD status of 'Of Concern', and 341 ha of remnant vegetation with a 'No Concern at Present' status (**Table 3.2**).

With the exception of RE11.9.5 and RE11.3.25, all RE types identified in the mapping were verified during the field assessment. An additional four RE types (i.e. RE11.4.8a, RE11.3.27i, RE11.5.5 and RE11.5.9) were also detected during the field survey (**Table 3.2**).

There are several reasons for discrepancies between DNRM mapped and ground-truthed remnant vegetation within this study area. First, the broad scale used for the DNRM mapping (i.e. 1:100 000 scale) does not capture the variation of REs that make up smaller patches of vegetation. DNRM mapping is also undertaken from desktop using satellite imagery and aerial photographs and is therefore not usually ground-truthed. The error associated with this method was evident in the study area as many REs were ground-truthed to be completely different from those mapped. Areas mapped by DNRM as HVR were also ground-truthed to be remnant. This may reflect a time lag from when mapping was undertaken; although maps are updated relatively frequently (every two years).

A detailed description of the vegetation communities recorded during the field assessment that qualify as remnant vegetation, including the analogous RE types and extents, is provided in **Section 3.4**.



DNRM Regulated Vegetation

Figure 3.2

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	26/11/2013
Approved by:	GG	Date:	26/11/2013

Source: Base topographic data supplied by CCL & © Bing Aerials.
DNRM Regulated Vegetation Management Map (2013a)
DNRM RE Map Version 8.0 (2013b)

- Terrestrial Ecology Study Area
- EIS Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Regulated Vegetation Category

- B Area
- C Area
- X Area

DNRM Regional Ecosystems (Biodiversity Status)

- Of Concern
- Endangered

0 0.5 1 2
Kilometres

Datum: GDA94

RPS

Table 3.2: DEHP's Mapped REs and Ground-truthed REs within Study Area

RE Code	RE Description	VM Act Status	Biodiversity Status	DEHP Mapped Extent (ha)	Ground-truthed Extent (ha)
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Endangered	13	14
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *Acacia argyrodendron* on Cainozoic clay plains	Endangered	Endangered	27	15
11.4.8a	Palustrine wetland (e.g. vegetated swamp). Gilgai and small depressions on clay plains usually associated with *Acacia harpophylla* ecosystems.	Endangered	Endangered	N/A	20
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Endangered	Endangered	3	N/A
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of Concern	Of Concern	461	172
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains	Of Concern	Of Concern	66	165
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland on alluvial plains	Of Concern	Of Concern	248	390
11.3.25	*Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage lines	Least Concern	Of Concern	46	N/A
11.3.27i	Palustrine wetland (e.g. vegetated swamp). *Eucalyptus camaldulensis* or *E. tereticornis* woodland to open-woodland with sedgeland ground layer. Occurs in depressions on floodplains.	Least Concern	Of Concern	N/A	4
11.5.5	*Eucalyptus melanophloia*, *Callitris glaucophylla* woodland on Cainozoic sand plains/remnant surfaces. Deep red sands	Least Concern	No Concern at Present	N/A	66
11.5.9	*Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sand plains/remnant surfaces. Plateaus and broad crests	Least Concern	No Concern at Present	N/A	274
Total				**864**	**1,121**

3.4 Ground-truthed Vegetation Communities

3.4.1 Ground-truthed Vegetation Summary

Ground-truthing activities conducted during the field assessment were focussed only within the study area. This assessment identified 17 vegetation communities in varying condition states. The majority of the study area has been degraded through various rural land uses, particularly grazing, clearing and management practices. Extant vegetation is generally limited to the Dawson River and its associated tributaries, along fence lines, small wetlands, and road reserves. These areas are impacted upon by a variety of disturbances noted during the field assessment including historical clearing, grazing and weed invasion.

Ground-truthed vegetation communities found to be in remnant condition within the study area were identified to be analogous to nine REs and sub-communities. These REs fall within six Broad Vegetation Groups (BVG), which are a higher level of grouping of vegetation communities adopted by DEHP that group ecologically similar RE types. BVGs provide an overview of vegetation communities across the state.

Table 3.3 outlines the BVG, RE type, VM Act and BD status, and corresponding ESA Category of each remnant vegetation community identified in the study area. The total area covered by each remnant vegetation community has been provided as a collective area for the corresponding BVG as per the requirements for calculating potential offsets.

Ground-truthed vegetation communities classified as HVR (i.e. has not been cleared since 31/12/1989) within the study area were identified as analogous with five REs and sub-communities. **Table 3.3** outlines the BVG, analogous RE type, VM Act status of each HVR vegetation community identified in the study area. The total area covered by each HVR vegetation community has been provided as a collective area for the corresponding BVG.

The broad vegetation communities identified within the study area are described in the following sections and mapped in **Figure 3.3**. A complete flora species list is provided in **Appendix 6,** photo plates for the vegetation communities are provided in **Appendix 7** and **Appendix 3** contains the BioCondition data and associated calculations for each of the vegetation communities.

3.4.2 Community 1 – *Eucalyptus tereticornis* and *Corymbia tessellaris* Open Forest

This vegetation community occurs predominantly in large linear patches (average 72ha) on alluvial plains along the Dawson River and its associated tributaries (**Figure 3.3**). The canopy layer is dominated by Queensland Blue Gum (*Eucalyptus tereticornis*) and Moreton Bay Ash (*Corymbia tessellaris*) with occasional occurrences of Coolibah (*Eucalyptus coolabah*). This community also occurs in a seasonally wet depression inside the proposed disturbance footprint (**Figure 3.3**) but is dominated by Queensland Blue Gum (*Eucalyptus tereticornis*) in that location.

The understorey layer consists of both a mid-storey and tall shrub layer. The mid-storey layer consists of a mixture of Swamp Mahogany (*Lophostemum suaveolens*), Sally Wattle (*Acacia salicina*), Moreton Bay Ash (*Corymbia tessellaris*) and Quinine Berry Tree (*Petalostigma pubescens*). The shrub layer consists of Currant Bush (*Carissa ovata*), Scrub Boonaree (*Alectryon diversifolius*), Wallaby Apple (*Pittosporum spinescens*), Red Ash (*Alphitonia excelsa*), Coffee Bush (*Breynia oblongifolia*), Dysentery Bush (*Grewia retusifolia*) and Shiny-leaved Canthuim (*Psydrax odorata*).

The ground layer is dominated predominantly by exotic grasses including Buffel Grass (*Cenchrus ciliaris*), Sabi Grass (*Urochloa mosambicensis*), Guinea Grass (*Megathyrsus maximus*), with some native species present such as Woodland Lovegrass (*Eragrostis sororia*). A variety of native and exotic forbs also occur within the ground layer including Spikey-headed Mat-rush (*Lomandra longifolia*), *Cyperus haspan*, Spiked Sida (*Sida hackettiana*), Townsville Stylo (*Stylosanthes humilis*) and of Noogoora Burr (*Xanthium pungens*). In some areas, particularly along the Dawson River, there were high infestations of Noogoora Burr.

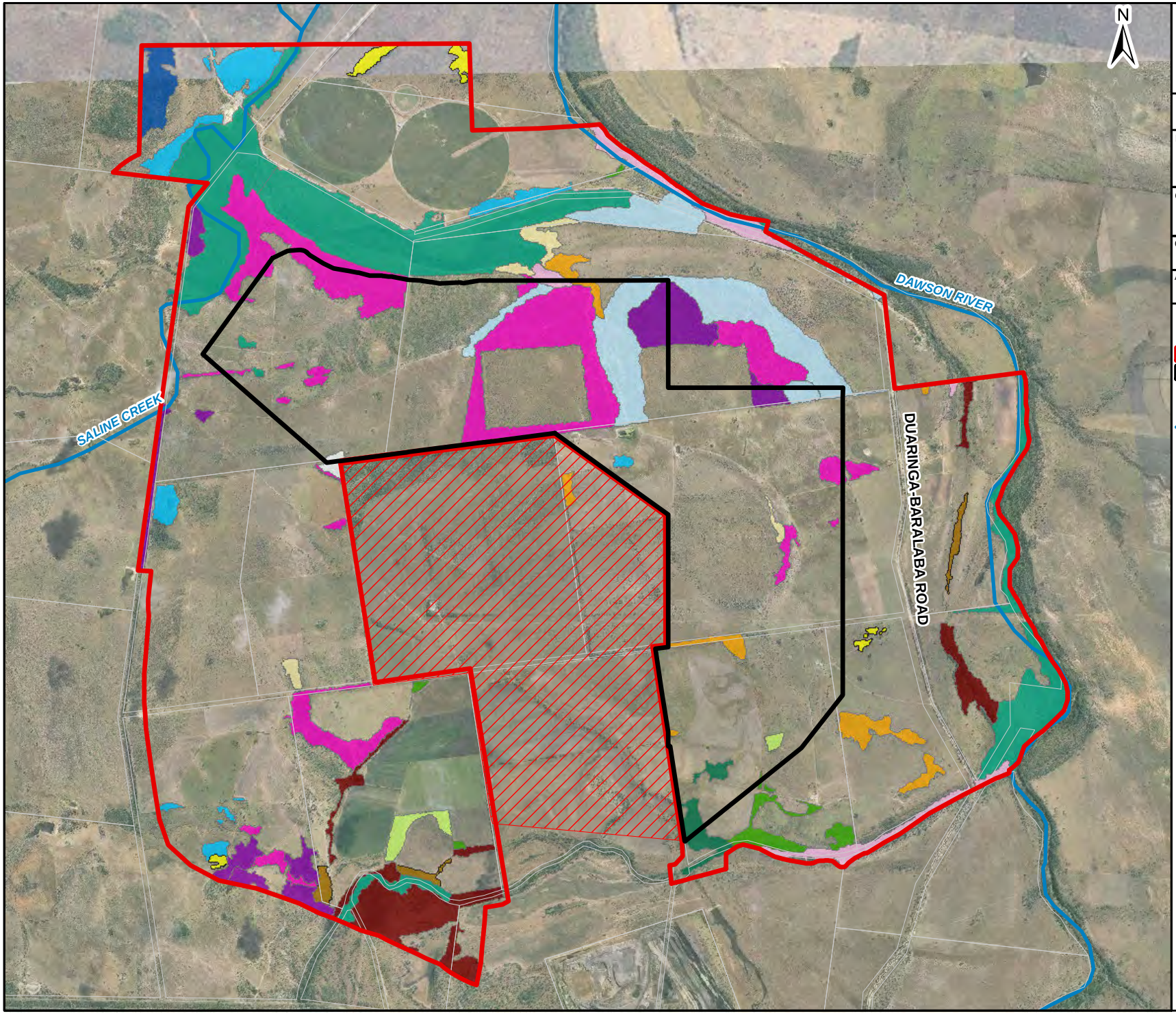
The vegetation community has a mature canopy layer with hollow-bearing trees, and generally a high native species richness and high availability of habitat resources such as fallen woody debris and leaf litter. However, generally weed incursion is high (60-90%), with only a small area in the south-west corner of the study area having low weed incursion (10%). Nonetheless due to the community's mature state and general undisturbed overstorey, BioCondition Assessment results classify this community in the second highest condition category, i.e. Category 2.

This community falls within BVG 16c, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.3.4, which has an 'Of Concern' VM Act and BD status (**Table 3.3**). Some small areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

Table 3.3: Total Area Covered by Ground-truthed REs within the Study Area

Broad Vegetation Group (1M)[1]	Vegetation Community		Vegetation Condition	RE Code	VM Act status	BD Status	ESA Category	Extent in Study Area (ha)
	No.	Name						
16 C	1	*Eucalyptus tereticornis* and *Corymbia tessellaris* Open Forest	Remnant	11.3.4	Of Concern	Of Concern	-	555
	3a & 3b	*Eucalyptus coolabah* Open Forest to Woodland & *Eucalyptus coolabah* Disturbed Open Forest to Woodland	Remnant	11.3.3	Of Concern	Of Concern	-	
Analogous to 16 C	3c	*Eucalyptus coolabah* Low Open Forest to Woodland	HVR	Analogous to 11.3.3	Of Concern	N/A	-	15
17 A	2	*Eucalyptus populnea* and *Eucalyptus melanophloia* Open Forest	Remnant	11.3.2	Of Concern	Of Concern	-	172
17 B	5a	*Eucalyptus populnea* +/- *Eucalyptus melanophloia* +/- *Eucalyptus cambageana* +/- *Corymbia tessellaris* Open Forest	Remnant	11.5.5	Least Concern	No Concern at Present	-	66
Analogous to 17 B	5b	*Callitris glaucophylla* Low Open Forest	HVR	Analogous to 11.5.5	Least Concern	N/A	-	24
18 B	4a	*Eucalyptus melanophloia* +/- *Eucalyptus crebra* +/- *Corymbia intermedia* +/- *Corymbia dallachiana* Open Forest	Remnant	11.5.9	Least Concern	No Concern at Present	-	274
Analogous to 18 B	4b	*Eucalyptus melanophloia* +/- *Eucalyptus crebra* +/- *Corymbia intermedia* +/- *Corymbia dallachiana* Low Open Forest	HVR	Analogous to 11.5.9	Least Concern	N/A	-	96
25 A	7	*Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland	Remnant	11.4.8	Endangered	Endangered	Category B	29
	8a	*Acacia harpophylla* +/- *Eucalyptus populnea* Open Forest to Woodland	Remnant	11.3.1	Endangered	Endangered	Category B	
Analogous to 25 A	8b &8c	*Acacia harpophylla* Low Open Forest & *Acacia harpophylla* Disturbed Low Open Forest	HVR	Analogous to 11.3.1	Endangered	N/A	-	46
34 D	6	*Eucalyptus tereticornis* Palustrine Wetland	Remnant	11.3.27i	Least Concern	Of Concern		24
	9a	*Acacia harpophylla* Palustrine Wetland	Remnant	11.4.8a	Endangered	Endangered	Category B	
Analogous to 34 D	9b	*Acacia harpophylla* Disturbed Palustrine Wetland	HVR	Analogous to 11.4.8a	Endangered	N/A		42

[1]BVGs are a higher-level grouping of regional ecosystems. 1M = 1:1,000,000 (regional scale).



Ground-truthed Vegetation Communities

Figure 3.3

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	25/02/2014
Approved by:	GG	Date:	25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Ground-truthed Vegetation Communities

- *A.harpophylla +/- E.populnea* Open Forest to Woodland, 11.3.1 (TEC)
- *A.harpophylla* Low Open Forest, 11.3.1 (some patches qualify as TEC)
- *A.harpophylla* Disturbed Low Open Forest, 11.3.1
- *A.harpophylla* Palustrine Wetland, 11.4.8a
- *A.harpophylla* Disturbed Palustrine Wetland, 11.4.8a (some patches qualify as TEC)
- *E.cambageana* and *A.harpophylla* Open Forest to Woodland, 11.4.8 (TEC)
- *E.coolabah* Open Forest to Woodland, 11.3.3 (TEC)
- *E.coolabah* Low Open Forest to Woodland,
- *E.coolabah* Disturbed Open Forest to Woodland, 11.3.3
- *E.melanophloia +/- E.crebra +/- C.intermedia +/- C.dallachiana* Open Forest, 11.5.9
- *E.melanophloia +/- E.crebra +/- C.intermedia +/- C.dallachiana* Low Open Forest, 11.5.9
- *E.populnea +/- E.melanophloia +/- E.cambageana +/- C.tesselaris* Open Forest, 11.5.5
- *C.glaucophylla* Low Open Forest, 11.5.5
- *E.populnea +/- E.melanophloia* Open Forest, 11.3.2
- *E.tereticornis* Palustrine Wetland,
- *E.tereticornis* and *C.tesselaris* Open Forest, 11.3.4

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

3.4.3 Community 2 – *Eucalyptus populnea* and *Eucalyptus melanophloia* Open Forest

This vegetation community occurs in several moderate sized patches (average 44ha) on alluvial plains in the north-east corner of the study area (**Figure 3.3**). The canopy layer is dominated by Poplar Box (*Eucalyptus populnea*) and Silver-leaved Ironbark (*Eucalyptus melanophloia*).

The understorey layer is contains both a complex mid-storey and shrub layer. The mid-storey layer contains a mixture of Sally Wattle, Bitter Bark (*Alstonia constricta*), Myrtle Tree (*Pysdrax oleifolia*), False Sandalwood (*Eremophila mitchellii*), Silver-leaved Ironbark, Poplar Box and Ironwood (*Acacia excelsa*). The shrub layer consists of Currant Bush, Bitter Bark, Quinine Berry Tree, Coffee Bush, Wilga (*Geijera parviflora*), Lime Bush (*Citrus glauca*), Whitewood (*Atalaya hemiglauca*), Scrub Boonaree, Bootlace Oak (*Hakea lorea*), *Denhamia oleaster* and Red Ash.

The ground is dominated by a mixture of native and exotic grasses, with several species of herbs and forbs also occurring. Grasses include Kangaroo Grass (*Themeda triandra*), Dark Wiregrass (*Aristida calycina*), Forest Lovegrass, Black Speargrass (*Heteropogon contortus*), Buffel Grass, Sabi Grass, Guinea Grass and Red Natal Grass (*Melinis repens*). Other common ground covers include Spiked Sida, Wombat Berry (*Eustrephus latifolius*), Townsville Stylo, *Cyperus haspan,* Slender Flat-sedge (*Cyperus gracilis*) and Pink Tongues (*Rostellularia adscendens*). Velvety Tree-pear (*Opuntia tomentosa*) was also found occasionally within this community.

The vegetation community has a mature canopy layer, complex vegetation structure, high native species richness and moderate availability of habitat resources such as fallen woody debris and leaf litter. However, generally weed incursion is high (average 70%), with exotic grasses being the most dominant. Nonetheless BioCondition Assessment results classify this community in the second highest condition category, i.e. Category 2.

This community falls within BVG 17a, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.3.2, which has an 'Of Concern' VM Act and BD status (**Table 3.3**). Some small areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.4 Community 3a – *Eucalyptus coolabah* Open Forest to Woodland

This vegetation community occurs as narrow linear patches (average 14ha) within larger intact remnant areas. The community is located on alluvial plains along the Dawson River and its associated tributaries (**Figure 3.3**). The canopy of this community is dominated solely by Coolibah with a sparse understorey of River Teatree (*Melaleuca trichostachya*) with Lignum (*Muehlenbeckia florulenta*) occasionally occurring.

The ground layer is dominated by native grasses including Swamp Millet (*Isachne globosa*), Native Millet (*Panicum decompositum*) and Queensland Bluegrass (*Dichanthium sericeum*). Other native ground covers include Umbrella Sedge (*Cyperus exalatus*), *Cyperus haspan,* Pink Tongues, Lesser Joyweed (*Alternanthera denticulata*), New Zealand Spinach (*Trianthema tetragonioides*), and Slender Knotweed (*Persicaria decipiens*). Some exotic ground covers also occur within the community and include Wandering Jew (*Commelina diffusa*), Noogoora Burr (*Xanthium pungens*), Wild Gooseberry (*Physalis angulata*), Red Caustic Creeper (*Chamaesyce prostrata*) and Balloon Vine (*Cardiospermum grandiflorum*).

The vegetation community has a mature canopy layer with many hollow-bearing trees, and generally has a moderate species richness and availability of habitat resources such as fallen woody debris and leaf litter, and low weed incursion (20%). BioCondition Assessment results classify this community in the second highest condition category, i.e. Category 2.

This community falls within BVG 16c, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.3.3, which has an 'Of Concern' VM Act and BD status (**Table 3.3**).

3.4.5 Community 3b – *Eucalyptus coolabah* Disturbed Open Forest to Woodland

This vegetation community occurs as several moderate sized patches (average 17ha) along drainage depressions associated with the Dawson River and its anabranch's alluvial flats (**Figure 3.3**). As with Community 3a, the canopy is solely dominated by Coolibah. The understorey is sparse with an absent mid-storey and an extremely sparse shrub layer consisting of regenerating Coolibah, Wilga, and Ironwood.

The ground layer is dominated by exotic species including Sabi Grass, Buffel Grass, Noogoora Burr, Wild Gooseberry, Townsville Stylo, Cobbler's Pegs (*Bidens pilosa*) and Milk Thistle (*Sonchus oleraceus*). However, some native ground covers do still occur, including Pitted Bluegrass (*Bothriochloa decipiens*), Pink Tongues, *Cyperus haspan,* Queensland Bluegrass and Emu Foot (*Cullen tenax*).

The vegetation community has a mature canopy layer, and generally has a moderate native species richness and availability of habitat resources such as fallen woody debris and leaf litter. However, generally weed incursion is high (>60%), with exotic grasses and Noogoora Burr being the most dominant. BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3.

This community falls within BVG 16c, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.3.3, which has an 'Of Concern' VM Act and BD status (**Table 3.3**). Some small areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.6 Community 3c – *Eucalyptus coolabah* Low Open Forest to Woodland

The vegetation community occurs in three small patches (average 5ha), along drainage depressions associated with the Dawson River's alluvial flats (**Figure 3.3**). The canopy is dominated by Coolibah and Red Bauhinia (*Lysiphyllum carronii*).

The understorey contains a mid-storey of Whitewood and Sally Wattle, and a shrub layer of regenerating Coolibah, Red Bauhinia and Sally Wattle.

The ground layer is dominated by native ground covers including Swamp Millet, Brigalow Grass (*Paspalidium caespitosum*), Pink Tongues, Lesser Joyweed, Queensland Bluegrass, New Zealand Spinach, Native Millet and Common Nardoo (*Marsilea drummondii*). However, some exotic species do occur, including Noogoora Burr, Guinea Grass, Phasey Bean (*Macroptilium lathyroides*) and Awnless Barnyard Grass (*Echinochloa colona*).

The vegetation community has an intact canopy and species richness representative of a remnant community, however due to historical clearing the community lacks the height, number of large trees and structural complexity of a remnant community. BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3.

This community is analogous to BVG 16C, constitutes HVR (i.e. has not been cleared since 31/12/1989) and is analogous to RE11.3.3, which has an 'Of Concern' status under the VM Act (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.7 Community 4a – *Eucalyptus melanophloia* +/- *Eucalyptus crebra* +/- *Corymbia intermedia* +/- *Corymbia dallachiana* Open Forest

The vegetation community occurs in numerous small to large patches (0.5 – 100ha) on Cainozoic sand plains and Tertiary laterised sandstones, siltstones and claystones on alluvial terraces throughout the study area (**Figure 3.3**). The canopy is dominated by Silver-leaved Ironbark with occasional occurrences Pink Bloodwood (*Corymbia intermedia*), Dallachy's Gum (*Corymbia dallachiana*) and Narrow-leaved Ironbark (*Eucalyptus crebra*).

The understorey contains both a mid-storey and shrub layer, with the mid-storey containing a mixture of species such as Quinine Berry Tree, *Melaleuca nervosa*, Whitewood, Red Ash, Moreton Bay Ash and Red Bauhinia. The shrub layer contains numerous species including Currant Bush, Scrub Hovea (*Hovea longipes*), Dysentery Bush, Scrub Boonaree, Bitter Bark, Lime Bush, Shiny-leaved Canthuim, Wilga, Wallaby Apple, Ironwood and Coffee Bush. Exotic species including Velvety Tree Pear and Lantana (*Lantana camara*) are also occasionally found within the shrub layer.

The ground layer is dominated by exotic grasses including Guinea Grass, Sabi Grass, Buffel Grass and Red Natal Grass. However, some native ground covers do occur including Dark Wiregrass, Black Spear Grass, Barbed Wire Grass (*Cymbopogon refractus*), Wiry Panic (*Entolasia stricta*) and Fine Sida (*Sida filiformis*).

The vegetation community has a mature canopy layer, a moderate native species richness and availability of habitat resources such as fallen woody debris and leaf litter. However, weed incursion is often high (average 88%), with exotic grasses being the most dominant. BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3.

This community falls within BVG 18B, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community), is analogous with RE11.5.9 which has a 'Least Concern' status under the VM Act and has a 'No Concern at Present' BD status (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.8 Community 4b – *Eucalyptus melanophloia* +/- *Eucalyptus crebra* +/- *Corymbia intermedia* +/- *Corymbia dallachiana* Low Open Forest

The vegetation community is located in several small to medium sized patches (1.5 – 40ha) on Cainozoic sand plains and Tertiary laterised sandstones, siltstones and claystones on alluvial terraces throughout the study area (**Figure 3.3**). An emergent layer of Silver-leaved Ironbark occurs above a canopy layer dominated by Silver-leaved Ironbark and Quinine Berry Tree. Occasional occurrences of False Sandalwood also occur within the canopy layer.

The understorey contains a sparse mid-storey and shrub layer, with the mid-storey containing Quinine Berry Tree and Black Ebony (*Diospyros humilis*). The shrub layer contains a mixture of Wallaby Apple, Bitter Bark, Wilga, Coffee Bush, Prickly Pine (*Bursaria incana*) and *Denhamia oleaster.*

The ground layer is dominated by exotic species including Buffel Grass, Guinea Grass, Red Natal Grass, Townsville Stylo and Flannel Weed (*Sida cordifolia*). However, some native species do occur, including Spiked Sida, Black Spear Grass, Dark Wiregrass, Slender Bottle-washers (*Enneapogan gracilis*) and Lantern Bush (*Abutilon oxycarpum*).

The vegetation community has an intact canopy and species richness representative of a remnant community, however due to historical clearing the community lacks the height, number of large trees and structural complexity of a remnant community. BioCondition Assessment results classify this community in the second lowest condition category.

This community is analogous to BVG 18B, constitutes HVR (i.e. has not been cleared since 31/12/1989) and is analogous to RE11.5.9, which has a 'Least Concern' status under the VM Act (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.9 Community 5a – *Eucalyptus populnea* +/- *Eucalyptus melanophloia* +/- *Eucalyptus cambageana* +/- *Corymbia tessellaris* Open Forest

The vegetation community is located in small patches (average 5ha) on Cainozoic sand plains and Tertiary laterised sandstones, siltstones and claystones on alluvial terraces mostly in the western portion of the study area (**Figure 3.3**). The canopy layer is dominated by Poplar Box with occasional occurrences of Silver-leaved Ironbark, Moreton Bay Ash and Blackbutt (*Eucalyptus cambageana*).

The understorey contains both a complex mid-storey and shrub layer, with the mid-storey layer dominated by Bulloak (*Allocasuarina luehmannii*) and Ironwood. The shrub layer consists of a mixture of Currant Bush, Scrub Boonaree, Lime Bush, Dysentery Bush, Bitter Bark, Whitewood, Wilga, Red Ash, *Denhamia oleaster*, Corkwood Wattle (*Acacia bidwillii*), Nepine (*Capparis lasiantha*), and Yellow Wood (*Terminalia oblongata*).

The ground layer is dominated by exotic grasses such as Guinea Grass, Sabi Grass, Red Natal Grass and Buffel Grass, though native species still do occur including Wombat Berry, Dark Wiregrass, Native Millet, Brigalow Grass, Barb Wire Grass, Wiry Panic and Fine Sida. Velvety Tree Pear also occurs occasionally throughout the community.

The vegetation community has a mature canopy layer, structurally complex understorey and generally has a moderate native species richness and availability of habitat resources such as fallen woody debris and leaf litter. However, generally weed incursion is high (average 85%), with exotic grasses being the most dominant. Nonetheless due to the community's mature state and general undisturbed overstorey, BioCondition Assessment results classify this community in the second highest condition category i.e. Category 2.

This community falls within BVG 17B, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.5.5, which has a 'Least Concern' status under the VM Act and a BD status of 'No Concern at Present' (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.10 Community 5b – *Callitris glaucophylla* Low Open Forest

The community occurs in a single moderate sized patch (25ha) on Cainozoic sand plains and Tertiary laterised sandstones, siltstones and claystones on alluvial terraces in the northwest corner of the study area (**Figure 3.3**). An emergent layer of Poplar Box, Queensland Blue Gum and Coolibah occurs over a canopy of White Cypress (*Callitris glaucophylla*) and Moreton Bay Ash.

The understorey is sparse with an absent mid-storey and sparse shrub layer. The shrub layer consists of a mixture of Quinine Berry Tree, Currant Bush, *Denhamia oleaster* and Red Ash.

The ground layer is dominated by exotic species, including Guinea Grass, Buffel Grass, Red Natal Grass, Noogoora Burr and Townsville Stylo. However, native species do also occur, including Dark Wiregrass, *Cyperus haspan*, Black Spear Grass, Comet Grass (*Perotis rara*), Native Jasmine (*Jasminum didymium*) and *Cheilanthes sieberi.* Velvety Tree Pear also occasionally occurs within this community.

The vegetation community has an intact canopy and species richness representative of a remnant community, however due to historical clearing the community lacks the height, number of large trees and

structural complexity of a remnant community. BioCondition Assessment results classify this community in the second lowest condition category i.e. Category 3.

This community is analogous to BVG 17B, constitutes HVR (i.e. has not been cleared since 31/12/1989) and is analogous to RE11.5.5, which has a 'Least Concern' status under the VM Act (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.11 Community 6 – *Eucalyptus tereticornis* Palustrine Wetland

The vegetation community occurs in a single small patch (4ha), on a low lying depression situated on the Quaternary Alluvium floodplain associated with the Dawson River (**Figure 3.3**). The canopy layer is dominated by Queensland Blue Gum with the understorey consisting only of a sparse shrub layer of Sally Wattle and Weeping Pittosporum (*Pittosporum augustifolium*).

The ground layer is dominated by a variety of native sedges, rushes and aquatic plants including Common Rush (*Juncus usitatus*), Variable Flatsedge (*Cyperus difformis*), Umbrella Sedge and *Caldesia oligococca*.

The vegetation community has a mature canopy layer with numerous hollow-bearing trees, and generally has a moderate native species richness and availability of habitat resources such as groundcover and leaf litter. Weed cover is also extremely low (5%) due to the dominance of native sedges and rushes. BioCondition Assessment results classify this community in the second highest condition category, i.e. Category 2.

This community falls within BVG 34D, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.3.27(i), which has a 'Least Concern' status under the VM Act but an 'Of Concern' BD status (**Table 3.3**). This entire vegetation community falls within a mapped Category X PMAV area and is therefore recognised by DEHP as non-remnant.

3.4.12 Community 7 – *Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland

The vegetation community occurs in several small patches (average 2.5ha), on Cainozoic clay plains throughout the study area (**Figure 3.3**). An emergent layer of Blackbutt and Coolibah occurs over a canopy dominated by Brigalow (*Acacia harpophylla*), with occasional occurrences of Queensland Bottle tree (*Brachychiton rupestris*).

The understorey contains both a complex mid-storey and shrub layer, with the mid-storey layer dominated by Brigalow, Bitter Bark and False Sandalwood. The shrub layer consists of a mixture of Scrub Boonaree, Wilga, Currant Bush, Lime Bush, *Denhamia oleaster,* and Shiny-leaved Canthuim.

The ground layer is primarily dominated by exotic grasses, including Guinea Grass, Buffel Grass and Sabi Grass. However, native species do also occur, including Brigalow Grass, Native Jasmine, Fairy Grass (*Sporobolus caroli*), Ruby Saltbush (*Enchylaena tomentose*), Wiry Panic, and Slender Flat-sedge. Velvety Tree Pear also occurs occasionally within the community.

The vegetation community has a mature canopy layer, complex structure, moderate native species richness, and a high availability of habitat resources such as fallen woody debris and leaf litter. However, grazing and fragmentation impacts are evident and generally weed incursion is high (average 65%), with exotic grasses being the most dominant. BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3.

This community falls within BVG 25A, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.4.8, which has an 'Endangered' VM Act and BD status. This community also classifies as a Category B ESA (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.13 Community 8a – *Acacia harpophylla* +/- *Eucalyptus populnea* Open Forest to Woodland

The vegetation community occurs in two small patches (average 3ha), on alluvial plains in the southern portion of the study area (**Figure 3.3**). The canopy layer is dominated by Brigalow with Poplar Box, Blackbutt and Coolibah occasionally occurring. The understorey consists of a sparse mid-storey and shrub layer dominated by Red Bauhinia and Yellow Wood.

Shallow gilgai are present within this community and are dominated by native sedges and rushes, such as *Cyperus haspan*, Lesser Joyweed, Slender Flat-sedge, Common Nardoo, New Zealand Spinach and Slender Knotweed. While in drier areas exotic grasses dominated, including Guinea Grass and Buffel Grass.

The vegetation community has a mature canopy layer, and generally has a moderate native species richness and moderate availability of habitat resources such as fallen woody debris and leaf litter. Weed incursion varies between patches within gilgai areas generally tending to have lower weed incursion (30%) compared to drier areas (90%). BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3.

This community falls within BVG 25A, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.3.1, which has an 'Endangered' VM Act and BD Status (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.14 Community 8b – *Acacia harpophylla* Low Open Forest

The vegetation community occurs in several small patches (average 4ha), on alluvial plains in the south and one patch in the north (**Figure 3.3**). In some areas an emergent layer of Poplar Box and Brigalow is present, however generally an open canopy layer is present and dominated by Brigalow with the occasional occurrences of Wilga, Whitewood and Yellow Wood.

The understorey contains a mid-storey and a sparse shrub layer, with the mid-storey layer comprising of a mixture of Wilga, Sally Wattle, Bitter Bark, Red Bauhinia and Supplejack (*Ventilago viminalis*). The shrub layer also contains a mixture of species, including Currant Bush, Red Bauhinia, Yellow Wood, Lime Bush, Nepine and Shiny-leaved Canthuim.

The ground layer is dominated by exotic species, including Guinea Grass, Buffel Grass, Red Natal Grass and Mayne's Pest (*Verbena aristigera*). However, native species do occur, including Black Spear Grass, Fairy Grass, Brigalow Grass Dark Wiregrass and Galvanised Burr (*Sclerolaena birchii*).

The vegetation community generally has the species richness that is representative of a remnant community and an intact canopy, however due to historical clearing the community lacks the canopy height or cover, a number of large trees, and structural complexity of a remnant community. Grazing impacts are evident and generally weed incursion is high (average 70%). BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3.

This community is analogous to BVG 25 A, constitutes HVR (i.e. has not been cleared since 31/12/1989) and is analogous to RE11.3.1, which has an 'Endangered' status under the VM Act (**Table 3.3**). Some areas of

this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.15 Community 8c – *Acacia harpophylla* Disturbed Low Open Forest

The vegetation community occurs in two patches (average 10ha), on alluvial plains in the southern portion of the study area (**Figure 3.3**). An emergent layer of Coolibah and Brigalow occurs above a canopy dominated by Brigalow with occasional occurrences of Red Bauhinia and Yellow Wood. Due to high levels of disturbance the community does not contain either a mid-storey or shrub layer.

The ground layer is dominated by exotic species, including Guinea Grass, Sabi Grass, Buffel Grass, Noogoora Burr and Wild Gooseberry. However, some native species do occur, including Swamp Millet, New Zealand Spinach, Pink Tongues and Umbrella Sedge.

The vegetation community has the height and generally the species richness that is representative of a remnant community; however due to the high level of disturbance the community lacks the canopy cover, and habitat complexity of a remnant community. Grazing impacts are evident and generally weed incursion is very high (average 95%). BioCondition Assessment results classify this community in the lowest condition category (Category 4).

This community is analogous to BVG 25 A, constitutes HVR (i.e. has not been cleared since 31/12/1989) and is analogous to RE11.3.1, which has an 'Endangered' status under the VM Act (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.16 Community 9a – *Acacia harpophylla* Palustrine Wetland

The vegetation community occurs in four small patches (average 5ha), on Cainozoic clay plains with deep gilgais that are seasonally inundated to form an ephemeral wetland (**Figure 3.3**). The canopy layer is also dominated by Brigalow with Yellow Wood and Queensland Bottletree occurring occasionally. Emergents of Brigalow and Queensland Bottletree are common within this community.

The understorey contains both a complex mid-storey and shrub layer, with the mid-storey being dominated by Brigalow, with Whitewood, Yellow Wood and Crow's Apple (*Owenia venosa*) occasionally occurring. The shrub layer consists of a mixture of species, including Currant Bush, Scrub Boonaree, *Denhamia oleaster,* Wilga, Shiny-leaved Canthuim and Wallaby Apple.

The ground layer consists primarily of a mixture of native and exotic grasses in drier areas, including Brigalow Grass, Sabi Grass, Native Millet, Fairy Grass and Buffel Grass. While in the gilgai areas native forbs, sedges and rushes dominated. These species include Umbrella Sedge, Slender Flat-sedge, Lesser Joyweed, Common Nardoo, Variable Flatsedge and Water Primrose (*Ludwigia* sp.).

The vegetation community has a relatively mature canopy layer, and generally has a high native species richness and availability of habitat resources such as fallen woody debris and leaf litter. Overall, weed incursion is moderate (50%). BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3. Whilst this community falls within the second lowest category, its score is in the highest percentile for this category.

This community falls within BVG 34D, is in remnant condition (i.e. >50% canopy and 70% height of the undisturbed community) and is analogous with RE11.4.8a, which has an 'Endangered' VM Act and BD status (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

3.4.17 Community 9b – *Acacia harpophylla* Disturbed Palustrine Wetland

The vegetation community occurs in several patches (average 6ha), on Cainozoic clay plains with deep gilgais that are seasonally inundated to form an ephemeral wetland (**Figure 3.3**). The canopy and mid-storey layers are dominated solely by Brigalow. A sparse shrub layer is also present, which is consists of a mixture of Scrub Boonaree, Sandalwood (*Santalum lanceolatum*) and Wilga.

Similarly to the less disturbed Palustrine Wetland (Community 9a), the ground layer in the surrounding gilgais, consists primarily of native forbs and sedges, including Common Nardoo, *Cyperus haspan*, Variable Flatsedge, Water Primrose and Berry Saltbush (*Einadia hastata*). Other areas consist of a mixture of native and exotic grasses, including Brigalow Grass, Buffel Grass, Guinea Grass and Fairy Grass.

The vegetation community generally has species richness representative of a remnant community and an intact canopy, however due to historical clearing / thinning and grazing the community lacks the height, number of large trees and structural complexity of a remnant community. BioCondition Assessment results classify this community in the second lowest condition category, i.e. Category 3. Whilst this community falls within the same category as the less disturbed Palustrine Wetland (Community 9a) its score is in the lowest percentile for this category and is on the cusp of the very lowest BioCondition Category, i.e. Category 4.

The community is analogous with BVG 34D, constitutes HVR (i.e. has not been cleared since 31/12/1989) and is analogous to RE11.4.8a, which has an 'Endangered' status under the VM Act (**Table 3.3**). Some areas of this vegetation community fall within a mapped Category X PMAV area and are therefore recognised by DEHP as non-remnant.

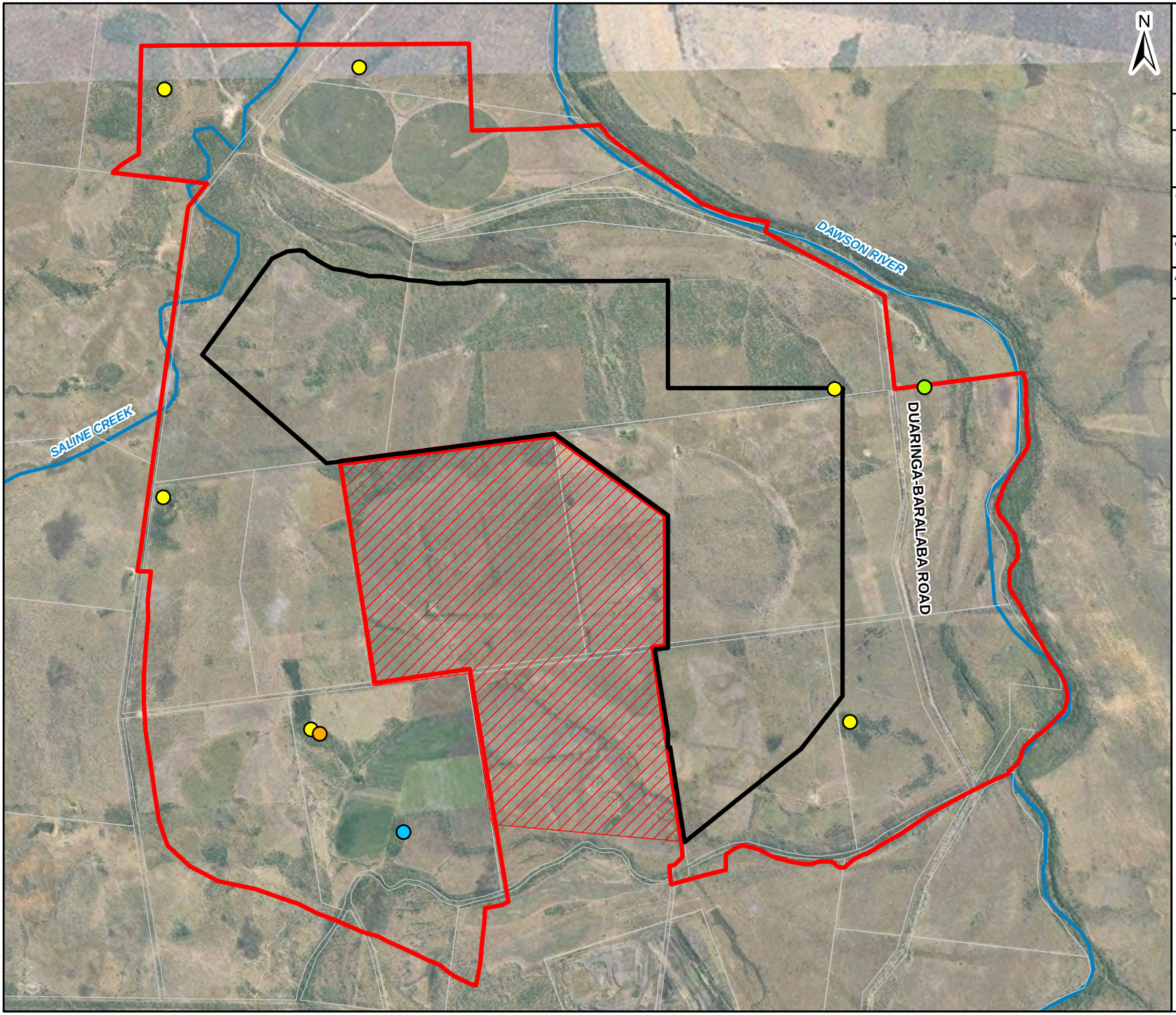
3.4.18 Community 10 – Cleared and disturbed area

Cleared areas dominate the study area, covering approximately 80% of the total area (**Figure 3.3**). These areas are devoid of a consistent canopy, mid-storey and shrub layers with the exception of areas containing young regrowth and extremely sparse occurrences of individual trees or shrubs. The ground layer is dominated by pasture species such as Guinea Grass, Buffel Grass and Sabi Grass with occasional occurrences of native grasses such as Black Spear Grass and Dark Wiregrass. The community is non-remnant and completely modified, and as such is not analogous to any native vegetation community or regional ecosystem.

3.5 Weed Species

Desktop assessment results identified nine Weeds of National Significance (WoNS) as potentially occurring within the study area (based on a 10 km buffer). However during the survey only three WoNS were recorded including Velvety Tree Pear, Lantana and Fireweed (*Senecio madagascariensis*). These species, as well as Mother of Millions (*Bryophyllum* spp.), were recorded during the field assessment. Under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) Velvety Tree Pear, Fireweed and Mother of Millions are classified as Class 2 weeds while Lantana is classified as Class 3.

Generally, the relative abundance of these species was low across the study area with only a few individuals being recorded across few sites. However, an extensive coverage of non-listed weed species was noted to occur across the study area with pasture weed species such as Guinea Grass, Buffel Grass, Sabi Grass and Noogoora Burr being most common. **Table 3.4** provides the class and locations, respectively, of the LP Act declared and WoNS species recorded within the study area. Locations of listed weed species are also presented in **Figure 3.4**. A list of weed species recorded during the field surveys is provided in **Appendix 6**.



Declared Weeds and WoNs Locations

Figure 3.4

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	26/11/2013
Approved by:	GG	Date:	26/11/2013

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Declared Weeds and/or WoNS

- Fireweed
- Lantana
- Mother of Millions
- Velvety Tree Pear

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

Table 3.4: Declared Weeds and WoNS Identified During the Field Survey

Species	Common Name	LP Act Class[1]	WoNS	Coordinates[2]
Bryophyllum spp.	Mother of Millions	2	X	-24.139908, 149.775873
Lantana camara	Lantana	3	✓	-24.130524, 149.767869
Opuntia tomentosa	Velvety Tree Pear	2	✓	-24.066936, 149.771649 -24.069034, 149.753078 -24.107964, 149.752922 -24.097629, 149.817029 -24.12942, 149.818516 -24.13011, 149.767041
Senecio madagascariensis	Fireweed	2	✓	-24.097455, 149.825604

[1]Defined under the Land Protection (Pest and Stock Route Management) Regulation 2003
[2]Co-ordinates presented does not suggest these are the only locations species occur

3.6 Threatened Ecological Communities

3.6.1 Desktop Assessment Results

The results of the EPBC Act Protected Matters Report identified four TECs as potentially occurring within the study area (based on a 10 km search radius), all of which are listed as 'Endangered' (**Table 3.5**). DNRM RE mapping for the study area (**Figure 3.2**) identifies listed RE communities for the following TECs:

- Brigalow (*Acacia harpophylla* dominant and co-dominant);
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions; and
- Weeping Myall Woodlands.

The occurrence of these TECs were targeted during the field assessment.

Table 3.5: Listed Threatened Ecological Communities potentially occurring within the Study Area

Ecological Community	EPBC Act Status[1]	Description[2]
Brigalow (*Acacia harpophylla* dominant & co-dominant)	E	This ecological community is characterised by the presence of Brigalow (*Acacia harpophylla*) as one of the three most abundant tree species. Brigalow is usually dominant in the tree layer or co-dominant with other species such as *Casuarina cristata* (Belah), other species of Acacia, or species of Eucalyptus. Occasionally Belah, or Acacia or Eucalyptus may be more common than Brigalow within the broad matrix of Brigalow vegetation. The structure of the vegetation ranges from open forest to open woodland. A prominent shrub layer is usually present.
Coolibah - Black Box Woodlands of the Darling Riverine Plains & the Brigalow Belt South Bioregions	E	This ecological community is associated with the floodplains and drainage areas of the Darling Riverine Plains and the Brigalow Belt South Interim Biogeographic Regionalisation of Australia (IBRA) bioregions. This ecological community represents occurrences of one type of eucalypt woodland where *Eucalyptus coolabah* subsp. *coolabah* and/or *Eucalyptus largiflorens* are the dominant canopy species and where the understorey tends to be grassy. The woodlands are found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The landscape is flat to low relief where small changes in slope and height can influence the species composition.
Semi-evergreen vine thickets of the Brigalow Belt (North/South) & Nandewar Bioregions	E	This ecological community comprises semi-evergreen vine thickets in eastern Queensland and northern New South Wales. Semi-evergreen vine thicket is considered an extreme form of dry seasonal subtropical rainforest. It is generally characterised by the prominence of trees with microphyll sized

Ecological Community	EPBC Act Status[1]	Description[2]
		leaves (i.e. leaves usually 2.5 cm to 7.6 cm long), the presence of Bottle Trees (*Brachychiton* spp.) as emergents from the vegetation, with thickets occurring in areas with a subtropical, seasonally dry climate on soils of high to medium fertility.
Weeping Myall Woodlands	E	The Weeping Myall Woodlands occur in a range of ecosystems from open woodlands to woodlands, generally 4-12 m high, in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species. Weeping Myall trees often occur in monotypic stands; however other vegetation may also occur in the ecological community, though not as dominant species. These include: Western Rosewood (*Alectryon oleifolius* subsp. *elongatus*); Poplar Box (*Eucalyptus populnea*); or Black Box (*Eucalyptus largiflorens*). The Weeping Myall Woodlands generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. The ecological community occurs on black, brown, red-brown or grey clay or clay loam soils.

[1]**Status:** E: 'Endangered'.
[2]**Sources:** DotE (2013a), DotE (2013b), SEWPaC (2011a) and SEWPaC (2008).

3.6.2 Field Survey Results

The field survey confirmed the presence of listed RE communities for the three TECs identified in the desktop assessment. These listed RE communities are associated with the following five vegetation communities and sub-communities ground-truthed within the study area (**Figure 3.5**):

(1) *Eucalyptus populnea* (Poplar Box) and *Eucalyptus melanophloia* (Silver-leaved Ironbark) Open Forest (RE11.3.2);

(2) *Eucalyptus coolabah* (Coolibah) Open Forest to Woodland (RE11.3.3);

  (a) *Eucalyptus coolabah* (Coolibah) Disturbed Open Forest to Woodland;

  (b) *Eucalyptus coolabah* (Coolibah) Low Open Forest to Woodland;

(3) *Acacia harpophylla* +/- *Eucalyptus populnea* Open Forest to Woodland (RE11.3.1);

  (a) *Acacia harpophylla* Low Open Forest;

  (b) *Acacia harpophylla* Disturbed Low Open Forest;

(4) *Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland (RE11.4.8);

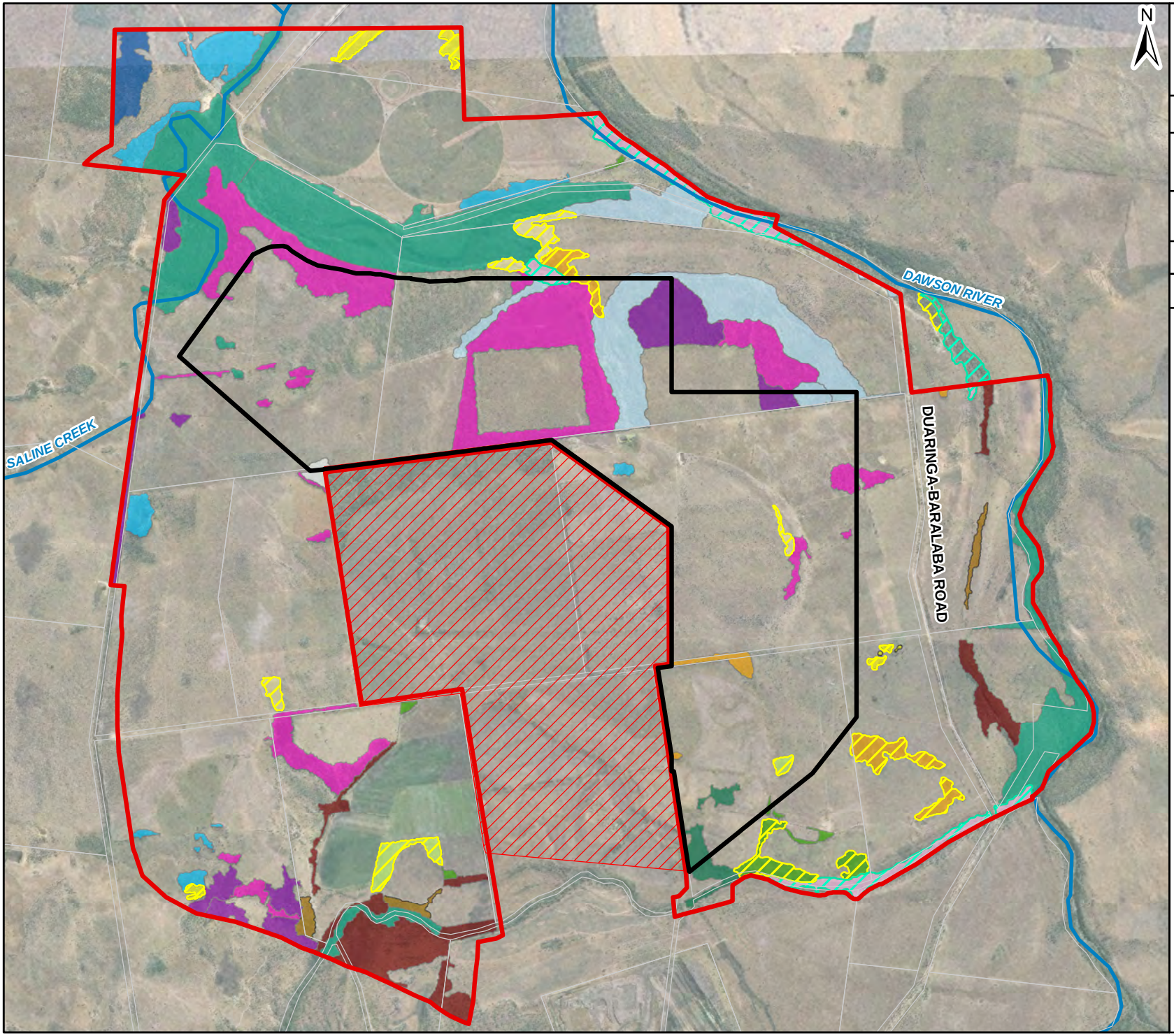
(5) Acacia harpophylla Palustrine Wetland (RE11.4.8a); and

(6) Acacia harpophylla Disturbed Palustrine Wetland.

Whilst analogous to listed REs, not all communities and sub-communities were found to meet the required criteria and condition thresholds to be classified as the associated TEC. The following Sections outline the results of the TEC field condition assessment.

3.6.2.1 Weeping Myall Woodland TEC Assessment

Eucalyptus populnea (Poplar Box) and *Eucalyptus melanophloia* (Silver-leaved Ironbark) Open Forest (RE11.3.2) is analogous to a listed RE for the Weeping Myall Woodlands TEC. As per the Commonwealth Listing Advice for the TEC, *Acacia pendula* (Weeping Myall) is required to be present as the sole or dominant overstorey species as well as be regenerating within two or more vegetation layers, or occur as a tree >4 m tall in a community comprised of 50% native species (SEWPaC, 2008).



Ground-truthed TECs

Figure 3.5

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	25/02/2014
Approved by:	GG	Date:	25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Ground-truthed Vegetation Communities

- *A.harpophylla* +/- *E.populnea* Open Forest to Woodland, 11.3.1 (TEC)
- *A.harpophylla* Low Open Forest, 11.3.1 (some patches qualify as TEC)
- *A.harpophylla* Disturbed Low Open Forest,
- *A.harpophylla* Palustrine Wetland, 11.4.8a
- *A.harpophylla* Disturbed Palustrine Wetland, 11.4.8a (some patches qualify as TEC)
- *E.cambageana* and *A.harpophylla* Open Forest to Woodland, 11.4.8 (TEC)
- *E.coolabah* Open Forest to Woodland, 11.3.3
- *E.coolabah* Low Open Forest to Woodland,
- *E.coolabah* Disturbed Open Forest to Woodland, 11.3.3
- *E.melanophloia* +/- *E.crebra* +/- *C.intermedia* +/- *C.dallachiana* Open Forest, 11.5.9
- *E.melanophloia* +/- *E.crebra* +/- *C.intermedia* +/- *C.dallachiana* Low Open Forest, 11.5.9
- *E.populnea* +/- *E.melanophloia* +/- *E.cambageana* +/- *C.tesselaris* Open Forest, 11.5.5
- *C.glaucophylla* Low Open Forest,
- *E.populnea* +/- *E.melanophloia* Open Forest, 11.3.2
- *E.tereticornis* Palustrine Wetland,
- *E.tereticornis* and *C.tesselaris* Open Forest, 11.3.4

Threatened Ecological Communities

- Brigalow
- Coolibah-Black Box Woodland

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

No individuals of Weeping Myall were recorded at all within this ground-truthed vegetation community, with Poplar Box and Silver-leaved Ironbark being the dominant canopy species. This vegetation community does not satisfy the species composition criteria for the TEC due to an absence of *Acacia pendula*. Therefore, the Weeping Myall Woodland TEC does not occur within the study area.

3.6.2.2 Coolibah - Black Box Woodlands TEC Assessment

Eucalyptus coolabah (Coolibah) Open Forest to Woodland (RE11.3.3) and its two sub-communities are analogous to a listed RE for the Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions TEC. As per the Approved Conservation Advice for the TEC, a number of condition thresholds relating to patch size, canopy structure, ground layer structure and native composition need to be met, along with the key diagnostic characteristics (RE type), in order for a community to be classified as the TEC (SEWPaC, 2011b). Not all areas ground-truthed as meeting the key diagnostic characteristics (i.e. RE type) were found to be in suitable condition to classify as the TEC.

The native composition condition threshold criterion for the TEC stipulates that the percentage of non-native perennial plant species cannot exceed the percentage cover of native species. The disturbed Open Forest to Woodland sub-community fails to meet the required native species composition criteria as weed coverage recorded within the understorey of this community ranges from 60% - 100%.

The Low Open Forest to Woodland sub-community does meet the required native composition criteria but does not meet the criteria related to the canopy structure. The canopy structure condition threshold criterion for the TEC stipulates that *Eucalyptus coolabah* or *E. largiflorens* needs to comprise >50% of tree crown cover, and consists of a DBH >30cm (DBH >20cm if coppiced) or be hollow-bearing (SEWPaC, 2011b). Whilst the canopy layer of this sub-community is dominated (>50% crown cover) by *Eucalyptus coolabah*, it consists of regenerating individuals with an average DBH of 15cm.

The Open Forest to Woodland community was found to meet both the canopy structure and native species composition criteria. All areas of the community comprises, on average, a 20% weed coverage within the understorey and canopy DBH ranging from 30cm – 55cm, in which the majority are hollow-bearing. In addition to this, all areas meet the required 5ha patch size criteria with patch size ranging from 9.2 – 27.2ha. The community also contains a 74% native ground layer coverage and therefore meets the required >10% native ground layer structure criteria. As such, only the *Eucalyptus coolabah* Open Forest to Woodland community meets the TEC criteria and therefore has been classified as a TEC.

Approximately 57ha of the Coolibah-Black Box Woodland TEC occurs within the study area (**Figure 3.5**).

3.6.2.3 Brigalow TEC Assessment

Acacia harpophylla +/- *Eucalyptus populnea* Open Forest to Woodland (RE11.3.1), *Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland (RE11.4.8), *Acacia harpophylla* Palustrine Wetland (RE11.4.8a) and their sub-communities are analogous to listed REs for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. As per the Species Profile and Threats Database description for a TEC, the community needs to be >0.5ha in size and retain the species composition and structural elements typical of the listed RE to be classified as the TEC (DotE, 2013a). The community also needs to contain <50% perennial weed cover within the understorey and possess connectivity value (DotE, 2013a). Not all areas ground-truthed as analogous to a listed RE were found to be the TEC.

Table 3.6 provides a summary of TEC assessment for each of the communities and sub-communities. Areas of TEC were determined by eliminating areas less than 0.5ha and then evaluating each area against three structural criteria relating to canopy height, canopy cover and shrub cover, as well as two composition

criteria relating to weed cover and species diversity. Connectivity values were also considered. The following sections detail the analysis.

The *Acacia harpophylla* Disturbed Low Open Forest sub-community failed to meet the required structural and compositional criteria for the TEC. This sub-community has a sparse canopy cover (7%) of relatively mature trees (12 m) and low structural complexity within the understorey (0% shrub cover). Low structural diversity within the understorey is generally typical of the Brigalow community (RE11.3.1) as undisturbed shrub cover is recorded at 8% in the technical description published by DEHP. Canopy height is also only 14% less than the average structure levels for the Brigalow RE. However, the combination of a sparse canopy and no shrub cover impacts on the community's ability to provide ecosystem functions that relate to these structural components such as provision of sheltering, foraging and breeding resources for fauna, nutrient cycling, maintenance of soil conditions, and retention of plant propagules.

Native species diversity is moderate with 58% of the total species listed in the technical description recorded within the community, however weed coverage is very high (98%) and is considered to significantly affect the native compositional values and functions of the community. The community is connected to the Dawson River anabranch; however its sparse vegetation structure does diminish this connectivity value. Overall, the community is not considered to retain the species composition and structural elements typical of the listed Brigalow RE, and is in poor condition with limited functional value. Therefore it does not qualify as the TEC.

Table 3.6: Brigalow TEC Assessment Summary

TEC Criteria[1]	Ground-truthed Brigalow Communities					
	RE11.3.1			RE11.4.8	RE11.4.8a	
	A. harpophylla +/- *E. populnea* Open Forest to Woodland	*A. harpophylla* Low Open Forest	*A. harpophylla* Disturbed Low Open Forest	*E. cambageana* and *A. harpophylla* Open Forest to Woodland	*A. harpophylla* Palustrine Wetland	*A. harpophylla* Disturbed Palustrine Wetland
Structure						
Canopy height: >50% of typical height recorded in an undisturbed community	✓	✓	✓	✓	✓	✓
Canopy cover: >40% of typical cover recorded in an undisturbed community	✓	✓	×	✓	✓	✓
Shrub cover: >50% shrub cover recorded in an undisturbed community	×	×	×	✓	✓	✓/×
Composition						
Weed cover: <50% weed cover	✓/×	×	×	×	✓	✓
Species diversity: >50% of total species recorded in an undisturbed community	✓	✓/×	✓	✓	✓	✓/×
Context						
Patch size: >0.5 ha	✓	✓/×	✓	✓/×	✓	✓
Connectivity: high connectivity with surrounding patches	✓/×	✓	×	×	✓	✓/×

TEC Criteria[1]	Ground-truthed Brigalow Communities					
	RE11.3.1			RE11.4.8	RE11.4.8a	
	A. harpophylla +/- *E. populnea* Open Forest to Woodland	*A. harpophylla* Low Open Forest	*A. harpophylla* Disturbed Low Open Forest	*E. cambageana* and *A. harpophylla* Open Forest to Woodland	*A. harpophylla* Palustrine Wetland	*A. harpophylla* Disturbed Palustrine Wetland
TEC Classification: meets all structure criteria, patch size and ≥1 composition criteria *OR* meets two structure criteria, patch size and species diversity composition criteria	✓	✓/×	×	✓	✓	✓/×

[1]Based on DotE requirements for the TEC classification

✓ = meets criteria; × = fails criteria; ✓/× = some areas of the community meet criteria whilst other areas fail the criteria

Portions of the *Acacia harpophylla* Low Open Forest and *Acacia harpophylla* Disturbed Palustrine Wetland meet the required structural and compositional criteria for the TEC (**Figure 3.5**). The *Acacia harpophylla* Low Open Forest sub-community has a moderately dense canopy layer (14%) of relatively mature trees (12 m tall), which is 54% and 7% less than the average structure levels, respectively, as described in the technical description published by DEHP for that Brigalow community (RE11.3.1). Furthermore, the *Acacia harpophylla* Disturbed Palustrine Wetland also has a moderately dense canopy layer (15%) of relatively mature trees (9 m tall), which is 52% and 40% less than the average structure levels, respectively, as described in the technical description published by DEHP for that Brigalow community (RE11.4.8a).

Structural complexity within the understorey layer for both sub-communities is low (0% - 1% shrub cover), however this is generally typical of the Brigalow communities which has a recorded undisturbed shrub cover of only 6% - 8% in the technical description published by DEHP. Species diversity however varied across the sub-communities. Native species richness within some areas is equivalent to an undisturbed community whilst other areas were below (<50%) the typical levels. Weed cover ranges from moderate to very high (40% - 100%).

Areas of these sub-communities that still retain the species composition and structural elements typical of the listed Brigalow RE are considered to meet the criteria to be classified as the TEC. Areas that still retain structural elements but not the compositional elements are not considered to meet the criteria to be classified as the TEC. These areas generally have a very high weed incursion and are essentially cattle camps with limited value and ecosystem function.

The *Acacia harpophylla* +/- *Eucalyptus populnea* Open Forest to Woodland is considered a TEC. The community has a moderately dense canopy layer (16%) of mature trees (17 m tall), and a moderate native species richness, which is either typical of the Brigalow community (RE11.3.1) or only 46% and 39% less than the average structure and diversity levels, respectively, as described in the technical description published by DEHP. Structural complexity within the understorey layer is low (0% shrub cover), however this is generally typical of the Brigalow community which has a recorded undisturbed shrub cover of only 8% in the technical description published by DEHP. Weed cover and connectivity values varies for this community with some patches containing moderate weed incursion (30%) and linkages to the Dawson River anabranch and other patches containing a high weed incursion (90%) and consisting of an small isolated patch.

However, as the community still retains the species composition and structural elements typical of the listed Brigalow RE, it is considered to classify as the TEC (**Figure 3.5**).

The *Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland is also considered a TEC. It has an intact canopy layer (50%) of relatively mature trees (11 m tall), and a moderate structural complexity within the understorey layer (8% shrub cover). Based on the technical descriptions published by DEHP, these structural parameters are typical for the Brigalow RE that the community is analogous to (RE11.4.8). Native species richness is also considered typical of the Brigalow RE with 72% of the total species listed in the technical description recorded within the community. Weed coverage within the community is high (90%) and the community does occur as a discrete patch with minor linkages connecting it to larger patches of vegetation. However, as the community still retains the species composition and structural elements typical of the listed Brigalow RE, it is considered to qualify as the TEC (**Figure 3.5**).

The TEC also includes the *Acacia harpophylla* Palustrine Wetland. It has an open canopy layer (23%) of relatively mature trees (13.5m high), and a moderate structural complexity within the understorey layer (7% shrub cover). Based on the technical descriptions published by DEHP, these structural parameters are either typical or only 10% - 30% less than the average structure levels for the Brigalow RE that the community is analogous to (RE11.4.8a). Native species richness is high for this community with a diverse range of native species recorded within each of the vegetation strata levels. Weed coverage is also moderate (50%) but connectivity values vary from highly connected to isolated patches. However, as the community still retains the species composition and structural elements typical of the listed Brigalow RE, it is considered to qualify as the TEC (**Figure 3.5**).

Approximately 99 ha of the Brigalow TEC occurs within the study area (**Figure 3.5**). Regardless of condition, any patches of Brigalow dominated vegetation that were less than 0.5 ha were not (as per the definition) considered as a TEC.

3.7 Conservation Significant Flora

3.7.1 Desktop Assessment Results

Results of the EPBC Act Protected Matters Search Tool identified a single NC Act and EPBC Act listed threatened species, Ooline, as potentially occurring within the study area (based on a 10km search radius). The nearest known record of the species, as determined by HERBRECS (Queensland Herbarium, 2013) is approximately 47 km southeast of the study area.

Based on DNRM Regional Ecosystem Mapping (Version 8.0) it was also considered likely that several Type A Restricted Plants, including plants from the Brachychiton genus and Orchidaceae family, may occur throughout the study area.

3.7.2 Field Survey Results

Targeted searches within the study area did not confirm the presence of Ooline or any other threatened flora species. However, the study area does contain Brigalow vegetation communities, which are known to provide suitable habitat for Ooline. In particular, Brigalow vegetation ground-truthed to be in remnant condition is considered to provide the highest habitat values for the threatened species, which includes areas of *Acacia harpophylla* +/- *Eucalyptus populnea* Open Forest to Woodland (Community 8a) and *Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland (Community 7) (**Figure 3.3**). Although not identified during the field surveys, it is possible Ooline may occur in suitable habitat in low numbers.

Type A Restricted Plants from the *Brachychiton* genus and Orchidaceae family that are regulated under the NC Act, were also recorded within the study area. Species from the Brachychiton genus occurred in several

communities across the entire study area at a low to moderate densities. Species from the Orchidaceae family were observed within fringing riparian vegetation along the Dawson River and its associated tributaries.

3.7.3 Essential Habitat

No 'Essential Habitat' or point records for threatened flora species have been identified within the study area (DNRM, 2013a).

4.0 Fauna Survey Results

4.1 Overview

A total of 10 habitat types were identified within the study area. These habitat communities ranged from poor to good condition depending on level of disturbance (i.e. from grazing and weed impacts), structural complexity and connectivity values. In general, habitat types assessed to be in good condition were considered to have high value. Habitat containing gilgais was identified to be of particular value for supporting threatened reptile species.

The fauna survey revealed the presence of 139 bird species, 36 mammal species (including 16 confirmed microbat species, 16 amphibian species, 27 reptile species and eight non-native pest animal species. Of the 20 threatened fauna species identified as potentially occurring based on the desktop review, six were confirmed to occur during the survey. Suitable habitat was identified for 11 additional threatened species. Of the 12 migratory species identified as potentially occurring based on the desktop review, six were confirmed to occur during the field survey. 'Essential Habitat' for two threatened fauna species: Squatter Pigeon and Brigalow Scaly-foot, is mapped in the study area.

The existing fauna values within the study area are listed in the following sections. A summary of values identified in both desktop assessment and field survey are outlined in **Table 4.1**.

Table 4.1: Summary of Existing Fauna Values within the Study Area

Database	Results		Section
	Desktop	Field Verified	
Wildlife Online (DEHP, 2014) EPBC Act Protected Matters Report (DotE, 2014	Five non-native pest fauna species have the potential to occur in the site locale (10km).	Eight pest fauna species were identified.	Section 4.3.5
Wildlife Online (DEHP, 2014) Queensland Museum Zoology Data Search (Queensland Museum, 2013) EPBC Act Protected Matters Report (DotE, 2014) Bird Data (Bird Data, 2013) Atlas of Living Australia (ALA, 2013) Eremaea Bird Species Search (Eremaea Birds, 2013)	20 threatened fauna species listed under the NC Act or EPBC Act have been recorded or have the potential to occur in the site locale (10km buffer).	Six fauna species either listed under the NC Act or EPBC Act were recorded and an additional 11 considered possible occurrences.	Section 4.4
Regulated Vegetation Management and Supporting Map (DNRM, 2013a)	'Essential Habitat' identified for Brigalow Scaly-foot and Squatter Pigeon.	No 'Essential Habitat' was mapped at the time of the field surveys and therefore these areas were not field-verified.	Section 4.4.3
Wildlife Online (DEHP, 2014) EPBC Act Protected Matters Report (DotE, 2014)	12 migratory species listed under the EPBC Act were identified as potentially (10km), including: ▪ 11 bird species; and ▪ One reptile species.	Six fauna species listed as migratory under the EPBC Act were recorded.	Section 4.5

4.2 Habitat Values

The study area contains a diverse range of habitat types that have differing states and conditions (**Figure 4.1**). These habitat types consist of, and provide, various quality (condition) habitats and resources (e.g. foraging and breeding niches) for a range of native fauna. The following sections outline the key habitat value and characteristics of each habitat type identified within the study area. Habitat data collected for each of the habitat types during the post summer survey is provided in **Appendix 8** and habitat data collected during the post winter survey is presented in **Appendix 9**.

4.2.1 Habitat Types

4.2.1.1 Riparian Woodland

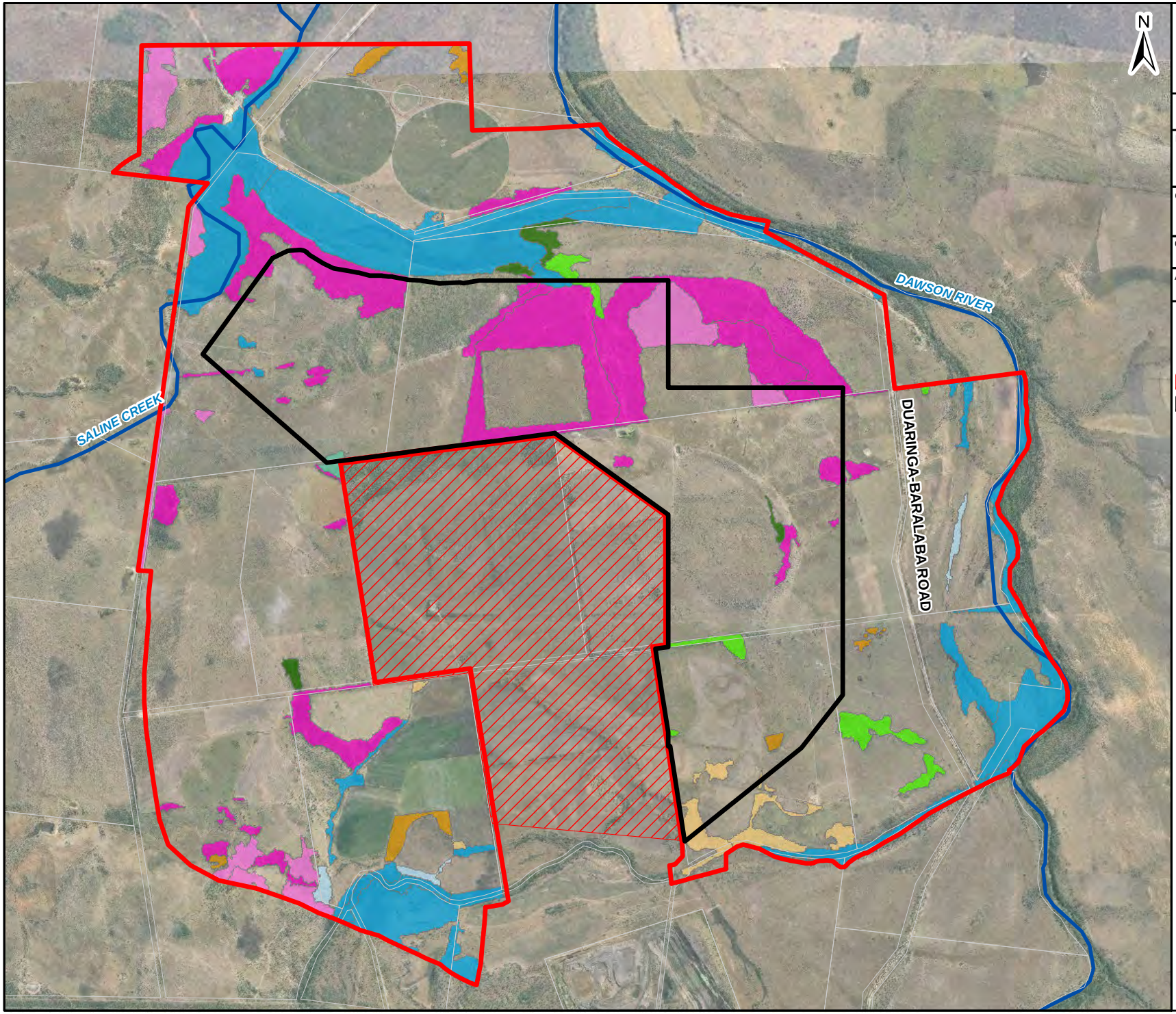
Riparian Woodland occurs predominantly in large linear patches along the Dawson River and its associated tributaries (**Figure 4.1**). It has a moderate structural complexity in comparison to other habitats within the study area. Riparian Woodland consists of a moderately dense canopy layer (48% cover) of large trees (22m high and 30-55cm DBH), a distinct mid-storey layer but an almost absent shrub layer (0.4% cover). This moderate structural complexity along with a high abundance of hollow bearing trees (22 per ha) provides shelter breeding and nesting resources for birds, arboreal mammals and bats, including significant species, such as the Rainbow Bee-eater (*Merops ornatus*) which was recorded in this habitat during the survey.

Riparian Woodland also contains one of the highest structurally complex ground layers of all of the habitats. This consists of a moderate to dense ground layer (68% grass cover) and large amounts of fallen woody debris (1625m per ha) including numerous large hollow bearing logs. This debris may be used for both shelter and basking by a number of reptile species, such as Ornamental Snake which was observed in this habitat during the survey. Leaf litter cover (30% cover) was relative low in comparison to other habitats, while litter depth (12mm deep) fairly similar to other habitats within the study area. The amount of litter cover and depth is insufficient to provide the sheltering functions predominantly required by Brigalow Scaly-foot (DotE, 2013c) and Collared Delma (DotE, 2013d). However, the extensive amount of woody debris and moderate to dense ground cover may substitute and complement some of the ecological functions usually provide by leaf litter.

The presence of permanent and ephemeral waterways within this habitat provides an important source of water for fauna species. In addition, during periods of drought this habitat would be highly important and provides refuge habitat for many fauna species. The majority of this habitat type is dominated by primary Koala food trees (*Eucalyptus tereticornis*) and therefore it provides potential habitat for this threatened species. However the Koala was not located during the survey. This habitat also contains connectivity values as it provides a continuous link for fauna to move between the study area and surrounding areas.

Based on BioCondition assessment results, this habitat was rated reasonably highly (average BioCondition Score = 66, BioCondition Class = 2) with minimal levels of grazing impacts and moderate weed invasion from pasture grasses. Overall this habitat consistently recorded high diversity levels across all fauna taxonomic groups.

Consequently, this habitat is considered to be in good condition.



Habitat Types

Figure 4.1

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	25/02/2014
Approved by:	GG	Date:	25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Ground-truthed Habitat Types

- Brigalow Palustrine Wetland
- Disturbed Brigalow Palustrine Wetland
- Brigalow Woodland
- Disturbed Brigalow Woodland
- Eucalypt Open Forest
- Disturbed Eucalypt Low Open Forest
- Ephemeral Wetland
- Riparian
- Disturbed Riparian

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

4.2.1.2 Disturbed Riparian Woodland

Disturbed Riparian Woodland occurs in three narrow patches associated with drainage lines and watercourses across the study area (**Figure 4.1**). The habitat is relatively low in structural complexity in comparison to other habitats within the study area. Historical clearing has highly simplified the structure of the habitat leaving only a low and moderately dense canopy layer (10 m high and 50 % cover) of small to moderate sized trees (15-35 cm DBH), with no understorey. As such it provides limited sheltering, breeding and nesting resources in the overstorey layers, particularly for cryptic species. However, small numbers of hollow bearing trees (6 per ha) do occur providing some sheltering, breeding and nesting resources for hollow dependent birds, arboreal mammals and microbats, although none were recorded within this habitat during the survey.

Although grass cover is high (80% cover), generally due to presence of minimal woody debris (220 m per ha) and low litter cover (12% cover), the ground layer is simplistic and unsuitable habitat for targeted threatened reptile species. This was evident by low reptile abundance observed in this habitat during the survey.

Furthermore, the presence of permanent and ephemeral waterways within this habitat is limited to small drainage lines or adjacent ponds, which provide minimal water resources for fauna species.

Based on BioCondition assessment results, this habitat is in moderate condition (average BioCondition Score = 56.3, BioCondition Class = 3) with moderate levels of disturbance from historical clearing, grazing and weed invasion.

This habitat scored a medium rating and is judged to be in moderate condition.

4.2.1.3 Eucalypt Open-forest

Eucalypt Open-forest occurs in numerous small to large patches across the majority of the study area (**Figure 4.1**). The habitat is relatively high in structural complexity in comparison to other habitats within the study area. It consists of a moderately dense canopy layer (40% cover) of medium to large trees (19 m high and 25-40 cm DBH), a distinct mid-storey and shrub layer (11% cover). Although structurally complex, due to the low abundance of hollow bearing trees (1 per ha) the potential sheltering, breeding and nesting resources for hollow dependent birds, arboreal mammals and microbats within this habitat is significantly diminished. The presence of high complexity strata does however provide foraging habitat for microbats and habitat for numerous small woodland birds. This habitat recorded the greatest diversity levels for these taxonomic groups.

This habitat also contains a moderately complex ground layer in comparison to other habitats within the study area. This consists of a moderately dense ground layer (36% grass cover) and moderate amounts of fallen woody debris (approximately 541 m per ha). This debris may be used for both shelter and basking by a number of reptile species. Leaf litter cover (48% cover) was relative high in comparison to other habitats, with litter depth (8 mm deep) fairly similar to other habitats within the study area. The amount of litter cover and depth is insufficient to provide the sheltering functions predominantly required by species such as Brigalow Scaly-foot and Collared Delma.

Based on BioCondition assessment results, this habitat is in good condition (average BioCondition Score = 64, BioCondition Class = 2) with minimal levels of grazing impacts and moderate weed invasion from pasture grasses.

Therefore, this habitat is considered to be of high value.

4.2.1.4 Disturbed Eucalypt Low Open-forest

Disturbed Eucalypt Low Open-forest occurs in numerous small to large patches throughout the study area (**Figure 4.1**). The habitat is relatively low in structural complexity in comparison to other habitats within the study area. Historical clearing has highly simplified the structure of the habitat leaving only a low and moderately dense canopy layer (9 m high and 39% cover) of small to medium sized trees (15-25 cm DBH), and a sparse shrub layer (5% cover). As such it provides limited sheltering, breeding and nesting resources in the overstorey layers, particularly for cryptic species. In addition, this habitat contains low numbers (2 per ha) of hollow bearing trees and therefore provides minimal sheltering, breeding or nesting resources for hollow dependent arboreal mammals, microbats and bird species.

Although grass cover is high (80% cover), due to absence of large amounts of woody debris (35m per ha) and low leaf litter cover (22% cover), the ground layer is simplistic and unsuitable habitat for targeted threatened reptile species. This was evidenced by low reptile abundance observed in this habitat during the field surveys.

Based on BioCondition assessment results, this habitat is in moderate condition (average BioCondition Score = 44.2, BioCondition Class = 3) with moderate to high levels of disturbance from historical clearing, fragmentation, grazing and weed invasion.

Hence this habitat is considered to be in moderate condition.

4.2.1.5 Ephemeral Wetlands

Ephemeral wetlands occur in a single small patch within the centre of the study area (**Figure 4.1**). The habitat has a moderate structural complexity in comparison to other habitats within the study area. The habitat consists of an open canopy layer (25.4% cover) of large trees (30-55 cm DBH and 25 m high), a distinct mid-storey layer and a sparse shrub layer (6.4% cover). However the habitat has a high abundance of hollow bearing trees (40 per ha), which provides sheltering, breeding and nesting resources for birds, arboreal mammals and bats.

The ground layer contains a relatively low grass cover (12.4% cover) and low abundances of fallen woody debris (77 m per ha) in comparison to other habitats within the study area. However, the structural complexity of this habitats ground layer is still moderately high with sedges and rushes occurring in high abundance, providing similar sheltering and nesting resources for reptiles and small mammals. In addition, a relatively moderate cover of leaf litter (34% cover) provides sheltering resources for numerous reptile and amphibian species. Amphibian diversity was noted to be high within this habitat type.

As this habitat is completely inundated on a periodic basis, it provides optimal habitat for many water dependent species, specifically amphibians and wetland birds, including Black-necked Stork (*Ephippiorhynchus asiaticus*), which was observed as a flyover during both field surveys, but not as a site resident.

Based on BioCondition assessment results, this habitat rated well (BioCondition Score = 74, BioCondition Class = 2) with minimal disturbance from grazing and weed invasion.

Hence this habitat is considered to be in very good condition

4.2.1.6 *Acacia harpophylla* Woodland

Acacia harpophylla woodland occurs in several small patches throughout the study area (**Figure 4.1**). The habitat is relatively high in structural complexity in comparison to other communities within the study area. It consists of a moderately dense canopy layer (33% cover) of moderate to large trees (20-35 cm DBH and

14m high), a distinct mid-storey layer and shrub layer (4% cover). This relatively high structural complexity provides an abundance of sheltering, breeding and nesting resources for woodland birds, which were recorded in high numbers within this habitat. However, a natural low abundance of hollow bearing trees (8 per ha) within this habitat means there is minimal of these resources available for hollow dependent species, which is typical in Brigalow communities.

The complexity of the ground layer within this habitat is the highest within the study area. This consists of a moderately dense grass cover (49% cover), high abundance of fallen woody debris (2084 m per ha), including numerous hollow bearing logs, and a moderate cover of leaf litter (34% cover and 15 mm deep). This debris may be used for both shelter and basking by a number of reptile species. This high structural complexity in the ground layer provides optimal habitat for numerous reptile species, including threatened species such as Yakka Skink. This optimal reptile habitat was emphasized by the high abundance of reptiles recorded.

Based on BioCondition assessment results, this habitat attracted a median rating (average BioCondition Score = 50, BioCondition Class = 3) with moderate levels of disturbance from grazing and weed invasion. This habitat was assessed as being in moderate condition.

4.2.1.7 *Disturbed Acacia harpophylla Woodland*

Disturbed *Acacia harpophylla* woodland occurs in numerous small to medium sized patches in the southern portion of the study area (**Figure 4.1**). The habitat is relatively low in structural complexity in comparison to other habitats within the study area. Historical clearing has highly simplified the structure of the habitat leaving only a low sparse canopy layer (11 m high and 23% cover), of small trees (10-20 cm DBH), and an absent shrub layer. As such it provides limited sheltering, breeding and nesting resources in the overstorey layers, particularly for cryptic species. In addition, this habitat contains low numbers (1 per ha) of hollow bearing trees and therefore provides minimal similar resources for hollow dependent arboreal mammals, microbats and bird species.

Although grass cover is high (95% cover), due to absence of large amounts of woody debris (262 m per ha) the ground layer is simplistic and unsuitable habitat for targeted threatened reptile species. In addition, these areas generally tended to have high levels of cattle grazing limiting their suitability for reptiles and other small ground dwelling animals. This was emphasized by low reptile abundance observed in this habitat during field surveys.

Based on BioCondition assessment results, this habitat received a relatively low rating (average BioCondition Score = 39.5, BioCondition Class = 4) with high levels of disturbance from historical clearing, grazing and weed invasion of exotic pasture grasses. This habitat was consequently judged to be in poor condition.

4.2.1.8 *Acacia harpophylla Palustrine Wetland*

This habitat type occurs on black cracking clay in four small patches across the study area (**Figure 4.1**). The habitat has a moderate structural complexity in comparison to other habitats within the study area. It consists of an open canopy layer (22% cover) of moderate to large trees (20-35 cm DBH and 13.5 m high), a distinct mid-storey layer and shrub layer (7% cover). Nonetheless its distinct mid-storey and shrub layer provides an abundance of sheltering, breeding and nesting resources for woodland birds, which were recorded in high numbers within this habitat. However, the absence of hollow bearing trees within this habitat means there is no sheltering, nesting and breeding habitat for hollow dependent birds, arboreal mammals and microbats.

This habitat also contains a moderate to high relative ground cover complexity, consisting of moderately dense grass cover (44% cover) and large amounts of woody debris (1092 m per ha) including numerous

hollow bearing logs. This cover and debris provides shelter, breeding refuges and basking areas for numerous reptile species, including Ornamental Snake which was observed in this habitat during the survey. This habitat also contains a moderate coverage of leaf litter (approximately 33% cover); however, the leaf litter depth (15 mm deep) is inadequate for providing sufficient sheltering functions for threatened reptile species, such as Brigalow Scaly-foot and Collared Delma.

This habitat also contains numerous ephemeral gilgais which support aquatic vegetation including sedges and rushes. The gilgais provide optimal habitat for amphibians, which in turn provide optimal foraging habitat for reptiles including potentially occurring threatened species. This habitat was found to contain a high diversity of reptiles and amphibians.

Based on BioCondition assessment results, this habitat was rated in the moderate range (average BioCondition Score = 55, BioCondition Class = 3) with moderate levels of disturbance from grazing and weed invasion. It is therefore considered to be of moderate value. However, this habitat is important for supporting threatened species due to the presence of ephemeral gilgais and the fact that it supports moderate structural complexity.

4.2.1.9 Disturbed *Acacia harpophylla* Palustrine Wetland

This habitat type occurs in numerous small patches throughout the study area (**Figure 4.1**). The habitat generally contains low structural complexity in comparison to other habitats within the study area. The habitat consists of a low sparse canopy cover (9 m tall and 15% cover) of small trees (10-20 cm DBH), and an absent understorey. As such it provides limited sheltering, breeding and nesting resources in the overstorey layers, particularly for cryptic species. In addition, this habitat contains no hollow bearing trees and therefore contains no nesting, breeding and sheltering resources for hollow dependent arboreal mammals, microbats and bird species.

The ground layer contains a moderate to low structural complexity in comparison to other habitats within the study area. This consists of moderate grass cover (30% cover) and moderate abundance of fallen woody debris (342 m per ha). This cover and debris provides shelter, breeding refuges and basking areas for numerous reptile species. However, the low abundance of leaf litter cover (24% cover and 8 mm deep) is inadequate for providing sufficient sheltering functions for threatened species, such as Brigalow Scaly-foot and Collared Delma.

This habitat also contains numerous ephemeral gilgais which support aquatic vegetation including sedges and rushes. The gilgais provide optimal habitat for amphibians, which in turn provide optimal foraging habitat for reptiles including potentially occurring threatened species.

Based on BioCondition assessment results, this habitat rated poorly. (average BioCondition Score = 41.6, BioCondition Class = 3) with moderate to high levels of disturbance from grazing and weed invasion.

Consequently this habitat is judged to be in poor condition. However, this habitat is potentially important for supporting threatened species due to the presence of ephemeral gilgais, although this value is compromised somewhat by low structural complexity and minimal ground debris.

4.2.1.10 Cleared and Disturbed Areas

This habitat type covers the majority of the study area, as shown in **Figure 4.1**. It is devoid of trees, with only minimal shrubs and a ground layer dominated by exotic pasture grasses. The habitat only contains sparse and very occasional individual hollow bearing trees, logs or woody debris, and therefore contains minimal habitat values. These areas would only be utilised for nesting and breeding by common and disturbance tolerant species such as the Australasian Pipit (*Anthus novaeseelandiae*), with other species only utilising

this habitat for foraging. Although highly disturbed and containing low habitat values, these areas are important for Squatter Pigeon, an EPBC Act listed threatened species recorded numerous times foraging within this habitat type.

The habitat does contain some gilgai areas with aquatic vegetation, however these areas are highly disturbed from cattle crazing, exotic pasture grass incursion and historical clearing. With the lack of overstorey vegetation and associated understorey resources (i.e. fallen woody debris), these gilgai areas provide limited habitat value.

Farm dams are also scattered through this habitat type. Whilst these provide large and more permanent sources of water for fauna, they lack a surrounding native vegetation community that is necessary to support most fauna species. However, the fringing aquatic vegetation would provide foraging and breeding resources for some common waterbirds. The NC Act listed Cotton-pygmy Goose (*Nettapus coromandelianus*) was observed utilising these areas during the survey, for foraging purposes.

4.2.1.11 Conclusion

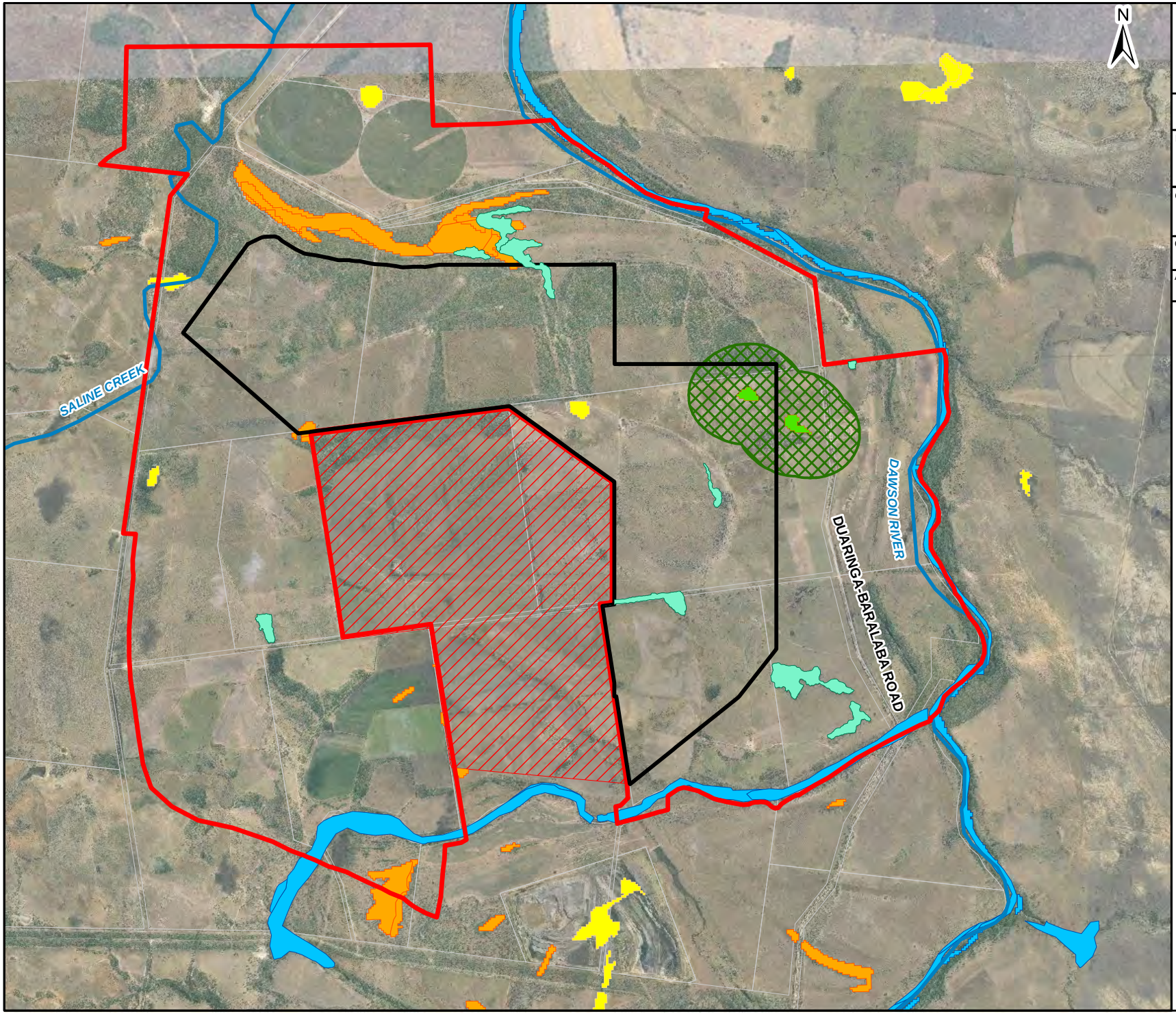
Based on BioCondition results, three habitat types were found to be in good condition: Riparian Woodland, Eucalypt Open Forest and Ephemeral Wetlands. These habitat types tended to be less disturbed (i.e. from grazing and weed impacts), had higher structural complexity and higher connectivity values and therefore were assessed to be of high value. Habitat types of moderate values included Disturbed Riparian Woodland, Disturbed Eucalypt Open Forest, *Acacia harpophylla* Woodland and *Acacia harpophylla* Palustrine Wetland. These habitat types were in slightly poorer condition, with higher levels of disturbance and overall lower ecological values than those that scored a higher rating. One community, Disturbed *Acacia harpophylla* Woodland, was highly disturbed and was therefore considered to be in poor condition.

The BioCondition assessment presents an overall score or rating for ecological value of habitat types. However, the value of certain habitats for protecting threatened species is not necessarily reflected in the overall habitat score. For example, gilgai habitat within the study area is extremely important for providing habitat for threatened reptile species such as the Ornamental Snake. Habitats containing gilgai include the *Acacia harpophylla* Palustrine Wetland and the Disturbed Brigalow Woodland, which were assessed to be in moderate and poor, condition respectively. For this reason, the value of these habitats is higher than what the BioCondition score would suggest.

4.2.2 Waterways

The study area contains numerous watercourses, from small creeks to large regionally significant waterways, including the Dawson River (**Figure 4.2**). Generally, riparian habitat located along these watercourses contains high floristic and fauna values due to the predominance of mature intact vegetation and presence of permanent and ephemeral water. The presence of large areas of water provide optimal habitat for water dependent species, including several threatened species. In addition, during drought periods these areas are likely to provide refuge habitat for a large range of fauna species.

The vegetation along these watercourses also provides numerous ecosystem functions including bank stability and surface runoff filtration. These areas also provide high dispersal potential for fauna and flora species due to the high connectivity of these habitats within the study area, and also their connectivity with surrounding areas. Predominantly these areas are some of the least disturbed communities within the study area, with disturbances generally limited to the understorey, including moderate weed incursion and grazing.



Wetlands and Watercourses

Figure 4.2

Project:	Baralaba North Continued Operations Project
Client:	Cockatoo Coal Ltd
Compiled by: MR	Date: 26/11/2013
Approved by: GG	Date: 26/11/2013

Source: Base topographic data supplied by CCL & © Bing Aerials.
DEHP Referable Wetland Mapping (2013b)

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway
- Additional Ground-truthed Palustrine Wetlands

Mapped Wetlands

- Lacustrine
- Palustrine
- Riverine

Mapped Protected Wetlands

- HES Wetland
- Wetland Trigger Area

0 0.5 1 2
Kilometres

Datum: GDA94

RPS

4.2.3 Wetlands

The desktop assessment identified two HES wetlands, and numerous other non- referable wetlands, as occurring within the study area (**Figure 4.2**). These areas were confirmed during the field survey, with the addition of several other palustrine wetland areas (**Figure 4.2**).

Many of the areas identified during desktop assessment are highly disturbed, containing little to no native vegetation, high levels of grazing, and in some instances have been converted into cropping lands. Areas representative of their natural state include wetlands mapped along the Dawson River and its associated tributaries, as well as the ephemeral wetland mapped in the centre of the study area (**Figure 4.1**). In addition, the lacustrine wetland within the study area was found to contain high habitat value, specifically for water dependent species such as the Cotton Pygmy-goose, which was observed during the survey.

Additional mapped palustrine wetlands contain large areas of ephemeral gilgais, and are associated with Brigalow patches analogous to RE 11.4.8a. These areas, as well as those identified during desktop analysis, provide several ecological functions including flood mitigation, water storage, and sediment, nutrient and pesticide trapping.

Wetlands and watercourses occurring within the study area are discussed in more detail in the BNCOP Aquatic Ecology Assessment report (FRC, 2013).

4.2.4 Corridors and Linkages

The study area and local landscape is heavily fragmented, a consequence of historical clearing activities. Waterways and associated vegetation (i.e. riparian) provide the primary corridor function across this landscape.

Overall the study area contains moderate - low connectivity. Areas of low connectivity are generally confined to the centre of the study area which is characterised by relatively small fragmented patches surrounded by cleared grazing paddocks. Whilst these areas do not provide a continuous linkage across the study area, they do provide stepping stone connectivity opportunities for mobile species (i.e. birds, bats, macropods, some ground-dwelling mammals and reptiles and pest animals) to areas of high connectivity located around the perimeter of the study area.

Highly connected areas around the perimeter of the study area are primarily associated with remnant vegetation (riparian) along the Dawson River and its associated tributaries. These areas are considered to fall within a bioregional corridor under the BPA and contain areas of State and Regional significance (BPA, 2008). These areas are also significant for being part of a large network of corridors that connect to larger remnant patches in surrounding areas, including Blackdown Tableland National Park and Isla Gorge National Park.

4.3 Fauna Inventory

The fauna survey revealed the presence of 139 bird species, 36 mammal species (including 16 confirmed microbat species, 16 amphibian species, 27 reptile species and eight non-native pest animal species. The results for each fauna group are discussed further in the following sections. A detailed fauna inventory is provided in **Appendix 10**.

4.3.1 Avifauna

During the survey a total of 136 native birds were recorded, as well as three non-native species (**Appendix 10**). All species were recorded via direct observation or call recognition, primarily during diurnal surveys. Of the 139 species recorded, three are listed under the NC Act with one also listed under the EPBC Act. These are the Squatter Pigeon, which is listed as 'Vulnerable' under the NC Act and EPBC Act, the Cotton Pygmy-Goose, and the Black-necked Stork, of which the latter two are both listed as 'Near Threatened' under the NC Act. The Squatter Pigeon was recorded on numerous occasions and locations across the study area and within a range of habitat types. Cotton Pygmy-Goose records were predominantly from wetlands and dams. The Black-necked stork was only recorded on a single occasion during both the post summer and post winter surveys, as a "flyover".

Six migratory species listed under the EPBC Act were recorded during the survey. These included Cattle Egret (*Ardea ibis*), Rainbow Bee-eater, Eastern Great Egret (*Ardea modesta*), Satin Flycatcher (*Myiagra cyanoleuca*), Caspian Tern (*Hydroprogne caspia*), and Glossy Ibis (*Plegadis falcinellus*). Most of these species were recorded on multiple occasions, with Cattle Egret and Eastern Great Egret observed near wetlands and dams, the Rainbow Bee-eater predominately observed in Riparian Woodland and Open Eucalypt Woodland, and the Satin Flycatcher observed in Brigalow Palustrine Wetland habitats. Caspian Tern and Glossy Ibis were recorded within, or flying over, ephemeral wetlands on only one occasion during the post winter survey.

Species diversity was similar across the majority of habitat types indicating a relatively even distribution of this group across the study area. However, higher abundances were generally located in habitats containing water (e.g. dams, wetlands and riparian areas). Known or potentially occurring threatened bird species are discussed further in **Section 4.4**, while migratory species are discussed in **Section 4.5**.

4.3.2 Mammals

4.3.2.1 Bats

During the post winter survey a total of six microbat species were captured in harp traps, including Gould's Wattled Bat (*Chalinolobus gouldii*), Chocolate Wattled Bat (*Chalinolobus morio*), Little Pied Bat (*Chalinolobus picatus*), Eastern Long-eared Bat (*Nyctophilus bifax*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*) and Gould's Long-eared Bat (*Nyctophilus gouldi*). The Little Pied Bat is listed as 'Near Threatened' under the NC Act.

Analysis of bat call data from both the post summer and post winter surveys identified up to 17 species of microbat occurring in the study area with 13 confirmed species and four possible species (**Table 4.2**).Three of these species were also captured in harp traps, including the Little Pied-Bat. Bat call and harp trap data indicate that this species utilises most habitat types within the study area.

It is possible that South-eastern Long-eared Bat, listed as 'Vulnerable' under the EPBC Act and NC Act, was present based on bat call data. However, calls from this species cannot be distinguished from other common *Nyctophilus* spp. that may occur in the area. The South-eastern Long-eared Bat was not captured in harp traps to confirm its occurrence. Three other *Nyctophilus* species were captured in harp traps, all of which could be responsible for the *Nyctophilus* calls. The additional targeted survey, and subsequent harp trap captures, did not result in the capture of *N corbeni*, nevertheless its presence cannot be conclusively ruled out (**Section 4.4**).

Table 4.2: Anabat Analysis Data

Scientific Name	Common Name	Riparian Woodland	Eucalypt Open-forest	Ephemeral Wetland	*Acacia harpophylla* Woodland	Disturbed *Acacia harpophylla* Woodland	*Acacia harpophylla* Palustrine Wetland	Disturbed *Acacia harpophylla* Palustrine Wetland
Chaerephon obensis	Northern Freetail Bat	✓	✓	✓	✓	x	✓	✓
Chalinolobus ouldi	Gould's Wattled Bat	✓	✓	✓	✓	✓	✓	✓
Chalinolobus orio	Chocolate Wattled Bat	✓	✓	x	x	x	✓	x
Chalinolobus igrogriseus	Hoary Wattled Bat	♦	♦	x	x	x	♦	♦
Chalinolobus picatus	Little Pied Bat	✓	✓	✓	✓	✓	✓	✓
Miniopterus stralis	Little Bent-wing Bat	✓	✓	x	✓	x	x	x
Miniopterus schreibersii	Common Bent-wing Bat	✓	✓	x	✓	♦	✓	✓
Mormopterus eccarii	Beccari's Free-tailed Bat	✓	✓	✓	✓	x	x	✓
Mormopterus species 2	-	✓	♦	✓	♦	x	♦	♦
Mormopterus pecies 3	-	♦	♦	x	x	x	x	x
Nyctophilus sp.	-	✓	✓	✓	x	x	✓	✓
Saccolaimus laviventris	Yellow-bellied Sheath-tailed Bat	✓	✓	✓	✓	✓	✓	✓
Scoteanax ueppellii	Greater Broad-nosed Bat	♦	x	x	x	x	x	x

Scientific Name	Common Name	Riparian Woodland	Eucalypt Open-forest	Ephemeral Wetland	*Acacia harpophylla* Woodland	Disturbed *Acacia harpophylla* Woodland	*Acacia harpophylla* Palustrine Wetland	Disturbed *Acacia harpophylla* Palustrine Wetland
Scotorepens alstoni	Western Broad-nosed Bat	✓	✓	✓	✓	✓	✓	✓
Scotorepens reyii	Little Broad-nosed Bat	✓	✓	✓	✓	✓	✓	✓
Taphozous eorgianus	Common Sheath-tailed Bat	♦	♦	x	x	x	x	x
Vespadelus averstocki	Inland Forest Bat	✓	✓	✓	♦	♦	♦	✓

Source: analysed by Greg Ford (Ford, 2013a, b &c; Shading indicates threatened species: ✓ = Species positively identified from call data, ♦ = Species possibly present, but not reliably identified, x = Species not identified

Two flying fox species were identified during the post winter season survey. An individual Black Flying-fox (*Pteropus alecto*) was flushed from a roost site in riparian habitat in the south-east corner of the study area and a deceased Red Flying-fox (*Pteropus scapulatus*) was found on a barbed wire fence within a grazed paddock to the south.

Known or potentially occurring threatened bat species are discussed further in **Section 4.4**.

4.3.2.2 Other Mammals

In total, eight native mammals and seven introduced species were recorded during the survey, with none listed as threatened under the NC Act or EPBC Act (**Appendix 10**). Native mammals recorded during the survey included three macropod species, two arboreal mammals, one rodent and the Short-beaked Echidna, which is a protected as a special 'Least Concern' species under the NC Act. The macropods and arboreal species were recorded on multiple occasions throughout the survey. Of these species, Eastern Grey Kangaroo (*Macropus giganteus*) was recorded in the highest abundance, followed by Common Brushtail Possum (*Trichosurus vulpecular*). Echidna was recorded on two occasions and Water Rat (*Hydromys chrysogaster*) was identified through identification of a feeding site (post winter survey) and personal observation by FRC aquatic ecologists (pers. comm.).

Non-native pest fauna species recorded during the survey are discussed in detail in **Section 4.3.5**.

4.3.3 Reptiles

A total of 27 reptile species were recorded in the study area including three records of *Denisonia maculata* (Ornamental Snake), which is listed as 'Vulnerable' under the EPBC Act and NC Act (**Appendix 10**). The Ornamental Snake was recorded once within Riparian Woodland and on two occasions within Brigalow Palustrine Wetland habitat during the post summer season survey. Generally, other reptile species were recorded evenly throughout all habitats. However, abundance varied between taxonomic groups.

Skinks and geckos were recorded in the highest abundance (>70 individuals) within the study area, followed by snakes (15 individuals) and dragons (three individuals). The abundance of species varied significantly within the skink and gecko taxonomic groups, with some species recorded in relative high abundances and others in relatively low abundances. Species recorded in relative high abundances included, Tussock Rainbow-skink (*Carlia vivax*) (17 individuals), Cream-striped Shining-skink (*Cryptoblepharus virgatus*) (25 individuals), *Lygosaurus foliorum* (12 individuals), and *Heteronotia binoei* (Bynoe's Gecko) (> 50 individuals).

Known or potentially occurring threatened reptile species are discussed further in **Section 4.4**.

4.3.4 Amphibians

Fifteen native amphibian species and one introduced species were recorded during the survey, with none listed as threatened under the NC Act or EPBC Act (**Appendix 10**). Amphibian species richness and abundance varied slightly between habitats with Riparian Woodland and Brigalow Palustrine and Ephemeral Wetland habitats being the most diverse and abundant, followed by Woodland habitats.

The abundance of individual species also varied significantly, with some species recorded in relative high abundances while others were only recorded on a single occasion. Native species that occurred in relatively high abundances included, Spotted Grass Frog (*Limnodynastes tasmaniensis*), Green-striped Frog (*Litoria alboguttata*), and Eastern Sedge Frog (*Litoria fallax*). Species recorded in low abundances included, *Cyclorana novaehollandiae* (Eastern Snapping Frog) (one individual) and *Lymnodynastes terraeginae* (Scarlet-sided Pobblebonk) (seven individuals).

4.3.5 Pest Species

The EPBC Protected Matters search Tool and Wildlife Online Database identified five non-native pest animal species as potentially occurring within the study area, namely:

- Cane Toad (*Bufo marinus*);
- Cat (*Felis catus*);
- Rabbit (*Oryctolagus cuniculus*);
- Pig (*Sus scrofa*); and
- Red Fox (*Vulpes vulpes*).

During the survey, all five species were directly observed within the study area. An additional three pest species were also recorded: European Hare (*Lepus europaeus*), House Mouse (*Mus musculus*), and Dog (*Canis lupis familiaris*). Hare's and House mice were observed directly, whereas dogs were identified from numerous tracks across the study area and travelling with landholders (i.e. in vehicles).

All pest species recorded within the study area are declared pests under the LP Act. Cane Toad, European Hare and House Mouse are Class 1 declared pests, while the others are all Class 2 pests. Landowners are legally required to take reasonable steps to keep their land free from Class 1 and Class 2 declared pests.

Although numerous pest species were recorded during the survey, none of them occurred in significantly high abundances apart from Cane Toad. The potential impact from pest species was evident. For example, numerous areas of pig rooting were identified across the site and large number of Cane Toads directly and indirectly potentially impact upon other species, including threatened species such as the Brigalow Scaly-foot, Dunmall's Snake, Collared Delma, Yakka Skink and the Ornamental Snake.

The diversity and abundance of non-native pest species within the study area provides an indication of the current disturbance levels. It is likely that pest fauna impact adversely on native fauna and associated habitats within the study area.

4.4 Conservation Significant Fauna

4.4.1 Desktop Assessment Results

The results of the EPBC Act Protected Matters Report and Wildlife Online identified 19 threatened fauna species that may potentially occur within the study area (based on a 10 km search radius), comprising six threatened reptiles, four threatened mammals and nine threatened birds.

Previous fauna surveys conducted within the study area have confirmed the presence of Squatter Pigeon and Short-beaked Echidna (Footprints, 2012). The Queensland Herbarium high quality records (Queensland Herbarium, unpublished data) indicate that Black-chinned Honeyeater (*Melithreptus gularis*), Brigalow Scaly-foot and Squatter Pigeon have also previously been recorded within the study area. A number of other species have been previously recorded within approximately 10 km of the study area, including: Black-breasted Button Quail (*Turnix melanogaster*), Fitzroy River Turtle (*Rheodytes leukops*), Square-tailed Kite (*Lophoictinia isura*), Cotton Pygmy-goose and Koala (Queensland Herbarium, unpublished; ALA, 2013; and DEHP, 2014).

4.4.2 Field Survey Results

Field survey results identified the occurrence of five threatened species within the study area, as presented in **Figure 4.3**. This included three records of Ornamental Snake, two records of Black-necked Stork, two records of Cotton Pygmy-goose, 62 records of Squatter Pigeon and 25 confirmed records of Little Pied Bat. Five of the Squatter Pigeon records were recorded outside the study area boundary (i.e. along roads). In addition, nine confirmed records of *Nyctophilus* sp. (possibly *Nyctophilus corbeni*) were identified within the study area. One special 'Least Concern' species was also identified, Short-beaked Echidna, of which two individuals were recorded.

Ornamental Snake was recorded once within a pitfall trap in Riparian Woodland and twice within *Acacia harpophylla* Palustrine Wetland via active searches during the post summer season survey (**Figure 4.3**). Both of these habitats contained highly structurally complex ground layers, including large amounts of woody debris, as well as the presence of ephemeral / permanent water. For this reason these habitats are considered high value for this species.

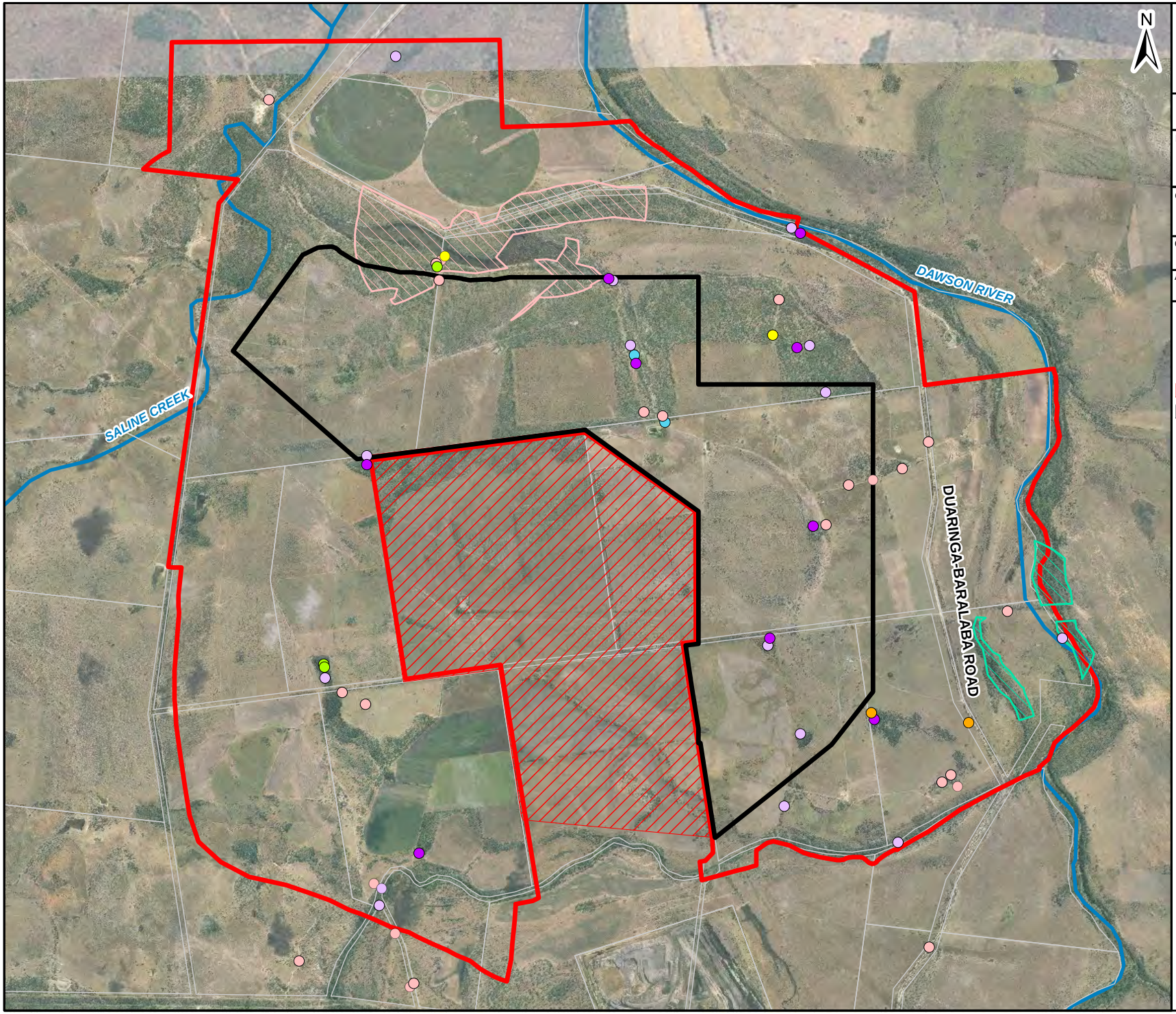
Squatter Pigeon was recorded on 35 occasions during the post summer season survey and 27 occasions during the post winter season survey. These records (not necessarily different individuals) resulted from a number of different habitat types (**Figure 4.3**). The habitat types where Squatter Pigeon was observed included Riparian Woodland, Disturbed *Acacia harpophylla* Palustrine Wetland, Eucalypt Open-forest and cleared grazing paddocks. This species is known to forage through a vast number of habitats, feeding on seeds of grasses, legumes and other herbs, as well as insects and ticks. Nesting predominantly occurs under grass tussocks in the habitats described above (DotE, 2013e). Squatter Pigeon would therefore utilise the majority of the study area for foraging due to the presence of large volumes of native and exotic grass seed. In addition, the presence of Eucalypt Open-forest in close proximity to water and eucalypt dominated Riparian Woodland provides optimal nesting and breeding habitat for the species, even during periods of drought.

The Black-necked Stork was recorded as a fly-over once during the post summer season survey and once during the post winter season survey (**Figure 4.3**). Riparian and wetland habitats support habitat resources for the species. Of particular importance are areas containing large bodies of slow moving or still water.

Cotton Pygmy-goose was recorded on two occasions during the post summer survey period, once at a farm dam and once in a watercourse within Eucalypt Open-forest habitat. Due to the importance of permanent water and hollow bearing trees for breeding of the species, areas containing these features are considered of high value. Riparian habitats are therefore considered most important for this species.

Previous records for Little Pied Bat occurring within proximity to the study area were not identified during the desktop assessment. However, one individual Little Pied Bat was captured using a harp trap within Riparian Woodland and vocalisations from this species were recorded on 14 occasions (post summer season survey) and 10 occasions (post winter season survey) on bat detection devices. At least one recording was obtained within each surveyed habitat type (**Figure 4.3**). Although the species was recorded within all habitats, most of these areas would be used for foraging only. High value habitat containing both breeding/roosting habitat as well as preferred foraging resources are limited to areas containing high abundances of hollow bearing trees. These areas are primarily limited to Riparian Woodland along the Dawson River and its palustrine wetland (associated with the relict drainage line of the Dawson River) to the north, as well as open eucalypt forest located within the northern portion of the study area.

Vocalisations of *Nyctophilus* sp. were recorded on nine occasions during the post summer survey and ten occasions during the post winter survey, at least once within all surveyed habitats except for *Acacia harpophylla* Woodland.



Conservation Significant Fauna Locations and DNRM Essential Habitat

Figure 4.3

Project: Baralaba North Continued Operations Project

Client: Cockatoo Coal Ltd

Compiled by:	MR	Date:	25/02/2014
Approved by:	GG	Date:	25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.
DNRM Vegetation Management Supporting Map (2013a)

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Conservation Significant Species Records

- Short-beaked Echidna
- Black-necked Stork
- Cotton Pygmy-goose
- Little Pied Bat
- Ornamental Snake
- South-eastern Long-eared Bat (Possible)
- Squatter Pigeon

Essential Habitat

- Brigalow Scaly-Foot
- Squatter Pigeon

0 0.5 1 2
Kilometres

Datum: GDA94

RPS

Although it is possible these vocalisations were made by the threatened South-eastern Long-eared Bat, it cannot be distinguished from the call of the common *Nyctophilus* spp. occurring within the study area. Three such "common" *Nyctophilus* spp. were captured within harp traps during the post winter season survey.

Two Short-beaked Echidnas were recorded during the post winter survey (one in brigalow and one near the road in open eucalypt/grassland). This species is found in a diverse range of habitats from dry eucalypt forest to disturbed grazing paddocks and as such, all habitats across the study area are considered suitable for the species.

None of the remaining 16 threatened species identified in the desktop assessment were identified within the study area. Suitable habitat for 12 of these species was located during the survey, including:

- Six reptiles – Brigalow Scaly-foot, Dunmall's Snake, Salt-water Crocodile (*Crocodylus porosus*), Yakka Skink, Collared Delma and Fitzroy River Turtle;
- Five Birds – Australian Painted Snipe (*Rostratula australis*), Red Goshawk (*Erythrotriorchis radiatus*), Star Finch (*Neochmia ruficauda ruficauda*), Black-chinned Honeyeater and Square-tailed Kite; and
- One mammal – Koala.

The likelihood of these species occurring within the study area is discussed below.

Brigalow Scaly-foot has previously been recorded within the study area (Queensland Herbarium, unpublished). Although Yakka Skink and Dunmall's snake have not previously been recorded within 10 km, the study area provides suitable habitat for these species. Suitable habitat for these three threatened reptiles including *Acacia harpophylla* habitat on alluvial clays and clay loams containing microhabitat features such as fallen timber, ground litter, grass tussocks and other surface debris. *Acacia harpophylla* habitats within the study area vary significantly, including in the availability and abundance of microhabitat features. Therefore, the suitability of habitat in supporting these species is also variable across the study area. Well connected areas containing minimal disturbance and a high structurally complex ground layer are considered to be of greatest value and potentially suitable for supporting these species.

Areas of high value for threatened reptile species are generally restricted to the *Acacia harpophylla* Woodlands, *Acacia harpophylla* Palustrine Wetlands and Riparian Woodland habitats. Within these habitats, grass cover is moderate to dense (44% - 68% cover), fallen woody debris is abundant (1092 – 2084 m per ha) and includes numerous hollow bearing logs, and a moderate coverage of leaf litter is present (34% cover and 15 mm deep). Overstorey vegetation is also intact and diverse. All other *Acacia harpophylla* habitat within the study area contains significantly lower values for both micro and macrohabitat features due to the greater level of disturbance evident within these habitat types. These areas are considered to be of low suitability.

Yakka Skink and Dunmall's Snake are also known to inhabit dry sclerophyll forest, particularly those analogous to RE11.3.2 [*Eucalyptus populnea* (Poplar Box) and *Eucalyptus melanophloia* (Silver-leaved Ironbark) Open Forest]. However, even the least disturbed areas of this habitat type, within the study area, generally provided limited sheltering sites. Fallen woody debris was moderately abundant (190 m per ha) and hollow bearing logs were observed to be few to absent. Therefore this habitat is considered to be of low suitability and is unlikely to support the species.

Collared Delma is also known to inhabit eucalypt and acacia dominated woodlands, however deep leaf litter, or tussock grass and shrubs (and rocks) are required as important habitat features. The Eucalypt Open-forest within the study area generally has a limited extent of these habitat features with leaf litter depth and shrub cover recorded at 8 mm and 11%, respectively. The Eucalypt Open-forest is therefore only considered marginal habitat for this species.

Black-chinned Honeyeater primarily occurs within communities along watercourses, as they provide both the foraging and nesting resources of the species. Riparian habitats within the study area are in good condition and are of greatest value and highly suitable for supporting the threatened species. The Black-chinned Honeyeater has previously been recorded within the study area (Queensland Herbarium, unpublished).

Salt-water Crocodiles usually occur within coastal waterways, however can occur hundreds of kilometres upstream of major waterways, such as the Dawson River. Fitzroy River Turtle's are known to inhabit permanent freshwater riverine reaches and large, isolated permanent waterholes. This species has been previously recorded along the Dawson River, within 10 km of the study area (Queensland Herbarium, unpublished). All habitats located along either the Dawson River or its associated tributaries are therefore considered potentially suitable for these species.

Habitat for the Australian Painted Snipe includes shallow terrestrial freshwater wetlands with fringing native vegetation, which is present within some areas of the *Acacia harpophylla* Palustrine Wetland habitat, Riparian Woodland and farm dams. This species is known to occur sporadically and is unpredictable in its distribution across Australia. The *Acacia harpophylla* Palustrine Wetland contains numerous ephemeral gilgais which support aquatic vegetation including sedges and rushes. Suitable habitat for the Australian Painted Snipe occurs where these gilgais are deep and can hold water for sustained periods of time. These gilgais provide optimal foraging habitat for this threatened species. Similarly, within the Riparian Woodland, suitable areas occur where permanent pools are present, which predominantly occurs within the palustrine wetland (associated with the relict drainage line of the Dawson River) to the north and the western extent of the southern anabranch. Farm dams are considered to be suitable for the Australian Painted Snipe where they are surrounded by a native vegetation community.

The Riparian Woodland also provides suitable nesting, foraging, breeding and refuge habitat for Red Goshawk, Square-tailed Kite and Star Finch due to its high structural complexity and proximity to water. The habitat comprises a moderately dense canopy layer (48% cover) of large trees (22 m high and 30-55 cm DBH) and contains a distinct mid-storey layer. Square-tailed Kite's have previously been recorded within a 10 km buffer of the study area (Queensland Herbarium, unpublished).

In addition, the high abundance of Koala food trees (*Eucalyptus tereticornis*) and high connectivity makes the Riparian Woodland potentially used by Koalas. Koala has been recorded within 10 km of the study area (DEHP, 2014).

Acacia harpophylla habitat within the study area is not considered suitable habitat for Black-breasted Button-quail as this habitat does not contain a dense shrub layer or thick leaf litter coverage, which are essential habitat requirements for the species.

Rocky habitat types or habitats containing suitable Northern Quoll (*Dasyurus hallucatus*) denning sites do not occur within the study area.

4.4.3 Essential Habitat

'Essential Habitat' for Squatter Pigeon and Brigalow Scaly-foot is mapped within the study area as presented in **Figure 4.3**. Approximately 182 ha of 'Essential Habitat' for Squatter Pigeon is mapped in the north, including a portion of remnant vegetation associated with the palustrine wetland (associated with the relict drainage line of the Dawson River) to the north. Approximately 25 ha of 'Essential Habitat' for Brigalow Scaly-foot is mapped in the southwest corner of the study area, including a portion of remnant vegetation along the Dawson River, as well as along a tributary extending north of the southern anabranch.

4.4.4 Likelihood of Occurrence

Table 4.3 provides an assessment of the potential for each threatened species to occur in the study area based on their habitat requirements and the condition and diversity of available habitat.

Five threatened species are known to occur within the study area; Ornamental Snake, Squatter Pigeon, Cotton Pygmy-goose, Little Pied Bat and Black-necked Stork. Short-beaked Echidna, a special 'Least Concern' species, is also known to occur within the study area.

Although South-eastern Long-eared Bat was not captured in harp traps during either of the two surveys, this species remains a possible occurrence in the study area due to anabat call data which identified *Nyctophilus* spp. to occur within the study area and disturbance footprint.

Four species are considered as likely to occur in the study area and eight species are considered to possibly occur. Species likely to occur include Salt-water Crocodile, Brigalow Scaly-foot, Fitzroy River Turtle and Koala (**Table 4.3**).

4.5 Migratory Species

4.5.1 Desktop Assessment Results

The results of the EPBC Act Protected Matters Report identified 12 migratory species that may potentially occur within the study area (based on a 10 km search radius), comprising of one reptile and eleven birds.

Previous fauna surveys identified Eastern Great Egret and Rainbow Bee-eater within the study area (Footprints, 2012). The Queensland Herbarium high quality records and Atlas of Living Australia records confirm these species, as well as Latham's Snipe (*Gallinago hardwickii*), to also have previously been recorded within the study area. In addition, Saltwater Crocodile (*Crocodylus porosus*), Cattle Egret, White-bellied Sea-Eagle (*Haliaeetus leucogaster*), White-Throated Needletail (*Hirundapus caudacutus*), Satin Flycatcher and Rufous Fantail (*Rhipidura rufifrons*) have been previously recorded within 10 km of the study area.

4.5.2 Field Survey Results

Field survey results identified the occurrence of six migratory species within the study area. This included records of Eastern Great Egret, Satin Flycatcher, Rainbow Bee-eater, Cattle Egret, Caspian Tern and Glossy Ibis. Locations of migratory species records within the study area are presented in **Figure 4.4**.

Eastern Great Egret and Cattle Egret were recorded within farm dams and wetlands during both the post summer and post winter season survey periods. The Eastern Great Egret occurs throughout a wide range of wetland habitats (e.g. coastal, freshwater, permanent and ephemeral, open and vegetated), while the Cattle Egret is more restricted to shallow, open and freshwater wetlands (DotE, 2013r and DotE, 2013s). Cattle Egrets also commonly occur within temperate grasslands where they forage. Within the study area, suitable nesting habitat for these species is minimal, with species preferring wooded swamps such as mangrove forests, Melaleuca swamps and eucalypt/lignum swamps. However, foraging habitat is abundant. Foraging habitat for both species includes riparian vegetation along the Dawson River and its associated tributaries, ephemeral wetlands, and farm dams. Cattle Egret would also utilise the large areas of pre-cleared grazing paddocks. Although large areas of foraging habitat occur within the study area, there is a paucity or complete absence of breeding habitat.

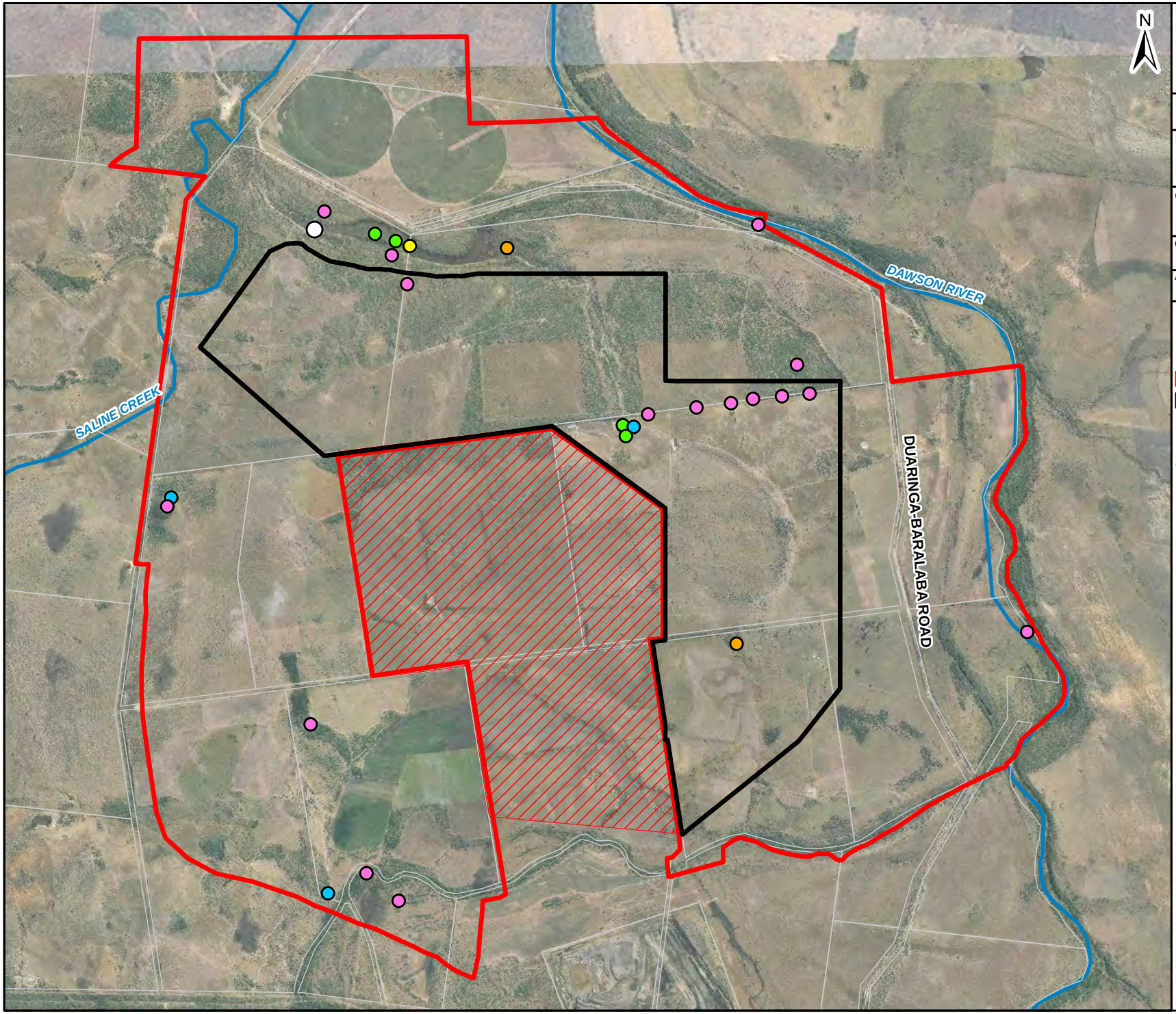
Table 4.3: Likelihood of Occurrence for Threatened Fauna Listed under the EPBC Act and/or NC Act

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence within Study Area
Birds						
Ephippiorhynchus asiaticus	Black-necked Stork	-	NT	The Black-necked Stork inhabits wetlands, such as floodplains of rivers with large shallow swamps and pools, and deeper permanent bodies of water. Occasionally individuals will stray into open grass, woodland areas or flooded paddocks in search of food (Pringle, 1985).	Species has not previously been recorded within a 10 km buffer of study area	**Known:** Species was recorded within study area, during the survey.
Erythrotriorchis radiatus	Red Goshawk	V	E	Occupies a range of habitats often at ecotones including coastal and sub-coastal tall open forest, tropical savannahs, woodlands and edge of rainforest and gallery forest along watercourses and wetlands that include Melaleuca and Casuarina species (DotE, 2013f).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Suitable habitat includes riparian areas associated with the Dawson River and anabranches.
Geophaps scripta scripta	Squatter Pigeon (southern)	V	V	The Squatter Pigeon (southern) occurs mainly in grassy woodlands and open forests that are dominated by eucalypts. It has also been recorded in sown grasslands with scattered remnant trees, disturbed habitats (i.e. around stockyards, along roads and railways, and around settlements), in scrub and Acacia regrowth, and remains common in heavily-grazed country north of the Tropic of Capricorn. The species is commonly observed in habitats that are located close to bodies of water (DotE, 2013e).	Species has previously been recorded within study area	**Known:** Species was recorded across the study area, during the survey.
Lophoictinia isura	Square-tailed Kite	-	NT	The Square-tailed Kite inhabits a range of timbered habitats including dry woodlands and open forests and is especially found along timbered watercourses (OEH, 2012).	Species has previously been recorded approximately four km south of the study area.	**Possible:** Suitable habitat includes riparian areas associated with the Dawson River and anabranches and Open Eucalypt Woodland.
Melithreptus gularis	Black-chinned Honeyeater	-	NT	Black-chinned Honeyeaters occupy the dry Eucalypt woodland within an annual rainfall range of 400-700 mm, particularly along watercourses. Favoured habitats incorporate a mixture of mature and regenerating woodland Eucalypts, although adjacent scattered paddock trees are also used (OEH, 2012).	Species has previously been recorded within study area	**Possible:** Suitable habitat includes riparian areas associated with the Dawson River and anabranches and Open Eucalypt Woodland.
Neochmia ruficauda ruficauda	Star Finch (eastern), Star Finch (southern)	E	E	In Queensland its population is extremely limited within the Desert Channel, Burdekin and Fitzroy Natural Resource Management Regions. Inhabits mainly grasslands, sedgelands and grassy woodlands that are located close to bodies of fresh water (DotE, 2013t). Studies at nine former sites of the Star Finch (eastern) found that the habitat consisted mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are *Eucalyptus coolabah, E. tereticornis, C. tessellaris, Melaleuca leucadendra, E. camaldulensis* and *Casuarina cunninghamii* (DotE, 2013g).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Suitable habitat includes riparian areas within the study area.
Nettapus coromandelianus	Cotton Pygmy-goose	-	NT	Cotton Pygmy-Geese are found on freshwater lakes, swamps and large water impoundments. They congregate in flocks on permanent water-bodies during the dry season. They lay 6-9 eggs in the hollows of trees that stand in or beside water (OEH, 2012)	Species has previously been recorded approximately 4 km south of study area.	**Known:** Species was recorded within study area, during the survey.
Poephila cincta cincta	Black-throated Finch	E	V	The Black-throated Finch (southern) occurs mainly in grassy, open woodlands and forests, typically dominated by *Eucalyptus*, *Corymbia* and *Melaleuca*, and occasionally in tussock grasslands or other habitats (for example freshwater wetlands), often along or near watercourses, or in the vicinity of water. Almost all recent records of the finch from south of the tropics have been in riparian habitat. The subspecies is thought to require a mosaic of different habitats in which it can find seed during the wet season (DotE, 2013h). The Black-throated Finch (southern) has occasionally been recorded in other habitats, including in freshwater wetlands, in cultivation surrounded by woodland, and in a heavily grazed paddock. It is likely that permanent sources of water (and the habitat surrounding these) provide refuge for Black-throated Finches (southern) during the dry season, especially during drought years (DotE, 2013h).	Species has not been recorded within a 10 km buffer of study area	**Unlikely:** Study area is located outside species known distribution.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence within Study Area
Rostratula australis	Australian Painted Snipe	V	V	Inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*). The Australian Painted Snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (DotE, 2013i). Australian Painted Snipe breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. Nest records are all, or nearly all, from or near small islands in freshwater wetlands, provided that these islands are a combination of very shallow water, exposed mud, dense low cover and sometimes some tall dense cover (DotE, 2013i). The Australian Painted Snipe has also been recorded nesting in and near swamps, canegrass swamps, flooded areas including samphire, grazing land, among cumbungi, sedges, grasses, salt water couch (*Paspalum*), saltbush (*Halosarcia*) and grass, also in ground cover of water-buttons and grasses, at the base of tussocks and under low saltbush. One nest has been found in the centre of a cow-pat in a clump of long grass (DotE, 2013i).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Suitable wetland habitat occurs within the study area.
Turnix melanogaster	Black-breasted Buttonquail	V	V	The Black-breasted Button-quail is restricted to rainforests and forests, mostly in areas with 770-1200 mm rainfall per annum. They prefer drier low closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest. They may also be found in low, dense acacia thickets and, in littoral area, in vegetation behind sand dunes (DotE, 2013j). Many areas of optimum habitat are located on highly fertile soils. It is believed that the highly fertile soils promote rapid leaf growth on plants. During dry periods, much of the foliage then drops to the ground thus maintaining the deep leaf litter layer which is crucial to the foraging requirements of the species. Many reports are from dry forest described as Bottletree Scrub, comprising Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*) and Bottletree (*Brachychiton rupestris*), with or without emergent Hoop Pine (Araucaria cunninghamii), with a shrub understorey and thick litter layer (DotE, 2013j).	Species has previously been recorded just over 10 km southeast of the study area.	**Unlikely:** Although species has been recorded previously within 10 km of the study area, no suitable habitat occurs within the study area.
Reptiles						
Crocodylus porosus	Salt-water Crocodile	-	V	In Queensland the species is usually restricted to coastal waterways and floodplain wetlands. Populations may also be found hundreds of kilometres upstream, such as in the Fitzroy River and the waterways of the southern Gulf of Carpentaria (DotE, 2013k).	Species has previously been recorded within a 10 km buffer of the study area.	**Likely:** Suitable habitat exists along the Dawson River and its associated tributaries and species has been recorded within a 10 km buffer of the study area.
Delma torquata	Collared Delma	V	V	This species is found in rocky sloped or ridge-top areas often westerly-facing, in Eucalyptus and Acacia dominated woodland with deep leaf litter and sparse understorey or tussock grass and shrubs or semi-evergreen vine thicket. Distribution includes south-east Queensland bioregion, extending 150 km west of Ulam Range to Blackdown Tableland National Park, and west to Expedition National. Regional ecosystems where the species commonly occurs include 11.3.2, 11.9.10, 11.10.1 and 11.10.4 (DotE, 2013d). Microhabitat features such as the presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) appears to be an essential characteristic of the Collared Delma and are always present where the species occurs (DotE, 2013d).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Marginal habitat occurs within the study area, including Eucalypt Open-forest habitat.
Denisonia maculata	Ornamental Snake	V	V	The Ornamental Snake's preferred habitat is within, or close to, habitat that is favoured by its prey - frogs. The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in Queensland Regional Ecosystem Land Zone 4, but also lake margins and wetlands. Gilgai formations are found where deep-cracking alluvial soils with high clay contents occur (DotE, 2013l).	Species has not previously been recorded within a 10 km buffer of study area	**Known:** Species was recorded within study area, during the survey.
Egernia rugosa	Yakka Skink	V	V	Occurs in open dry sclerophyll forest, woodland and scrub within the Mulga Lands and Brigalow Belt South Bioregion. Common woodland types include: *Acacia. harpophylla, A. aneura, A. catenulata, A. shirleyi, Casuarina cristata, E. populnea, Eucalyptus* spp., *Callitris glaucophylla* (DotE, 2013m). Microhabitat requirements include areas for the species to shelter including partly buried rocks, logs or tree stumps, root cavities, abandoned animal burrows and sometimes dense ground cover. In cleared habitat, this species can persist where there are shelter sites such as raked log piles, deep gullies, tunnel erosion/sinkholes and rabbit warrens. The species has also been found sheltering under sheds and loading ramps (DotE, 2013m).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Suitable habitat occurs within the study area.

Scientific Name	Common Name	EPBC Act Status[1]	NC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence within Study Area
Furina dunmalli	Dunmall's Snake	V	V	Habitat includes forests and woodlands on black alluvial cracking clay and clay loams dominated by *Acacia harpophylla, A. burowii, A. deanii, A. leiocalyx, Callitris* spp. or *Allocasuarina luehmannii*. Also found in *Corymbia citriodora, Eucalyptus crebra* and *E. melanophloia, Callitris glaucophylla* and *Allocasuarina luehmannii* open forest and woodland associations on sandstone derived soils. The species has been found sheltering under fallen timber and ground litter (DotE, 2013n).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Suitable habitat occurs within the study area.
**Paradelma orientalis*	Brigalow Scaly-foot	-	V	Occurs mostly within the Brigalow Belt South bioregion found in open forests, woodlands and mixed communities dominated by *A. harpophylla, A. cambagei, A. catenulata, A. shirleyi, A. falciformis, Corymbia citriodora, Eucalyptus crebra, E. populnea, Casuarina cristata, Callitris columellaris* and *Allocasuarina luehmannii*. Specific habitats in which the species has been recorded include RE11.4.3, 11.4.8, 11.4.9, 11.3.1, 11.5.16, 11.10.3, 11.8.5, 11.5.3 and 11.5.9 (DotE, 2013c). Microhabitat requirements include sandstone slabs, surface debris or grass hummocks (DotE, 2013c).	Species has previously been recorded within the study area.	**Likely:** Species has previously been recorded within the study area.
Rheodytes leukops	Fitzroy River Turtle	V	V	The Fitzroy River Turtle inhabits permanent freshwater riverine reaches and large, isolated permanent waterholes. It is only known from the Fitzroy River and its tributaries (DEHP, 2011b).	Species has previously been recorded approximately 4.5km south of the study area.	**Likely:** Species has been previously recorded within 5 km of study area and suitable habitat exists along the Dawson River and its associated tributaries.
Mammals						
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	V	V	Known populations in Queensland are from sandstone escarpments in the Carnarvon, Expedition Ranges and Blackdown Tablelands and Isla Gorge National Parks. Prefers sandstone cliffs and fertile woodland valley habitat as well as rainforest and moist Eucalypt forest habitats on other geological substrates (DotE, 2013o).	Species has not been recorded within a 10 km buffer of study area	**Unlikely:** No suitable habitat is present within the study area.
Chalinolobus picatus	Little Pied Bat	-	NT	Little pied bats have been recorded roosting in tree hollows, caves, abandoned mines, and buildings. Roosts in tree hollows are in dead limbs and hollowed stumps, and occur in mature mulga, bloodwoods and other large eucalypts. In the Brigalow Belt region of central southern inland Queensland, it is found in Brigalow/Belah associations, semi-evergreen vine thickets, poplar box woodlands and *Callitris/Allocasuarina* dominated forests with emergent eucalypts (DSITIA, 2012).	Species has not previously been recorded within a 10 km buffer of study area	**Known:** Species was recorded across the study area, during the survey.
Dasyurus hallucatus	Northern Quoll	V	LC	The Northern Quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern Quoll habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. Rocky habitats are usually of high relief, often rugged and dissected but can also include fields or caves in low lying area. Eucalypt forest or woodland habitats usually have a high structural diversity containing large diameter trees, termite mounds or hollow logs for denning purposes. Dens are made in rock crevices, tree holes or occasionally termite mounds. Northern Quolls sometimes occur around human dwellings and campgrounds. Northern Quolls appear to be most abundant in habitats within 150 km of the coast (DotE, 2013p).	Species has not been recorded within a 10 km buffer of study area	**Unlikely:** No suitable habitat is present within the study area.
Nyctophilus corbeni (South-eastern form)	South-eastern Long-eared Bat	V	V	Limited distribution around the Murray-Darling Basin in south-eastern Australia. This species occurs in a range of inland woodland vegetation types, but is most common in box, ironbark and cypress pine woodlands. Has been recorded in semi-green vine thicket with *Brachychiton* sp. emergent, inland dry sclerophyll forest, open forest with grass trees, Callitris forest, mixed Eucalyptus, Poplar box forest and open forest with mid-storey Allocasuarina and Callitris (DotE, 2013q).	Species has not previously been recorded within a 10 km buffer of study area	**Indeterminate:** Species was possibly recorded across the study area, during the survey.
Phascolarctos cinereus	Koala	V	V, SPL	Common throughout the broad band of forests and woodlands dominated by Eucalyptus spp. extending from north Queensland to the south-eastern corner of mainland South Australia. Occupy forests and woodlands where there are acceptable food trees (*Eucalyptus* spp., *Corymbia* spp., etc.). Distribution is affected by altitude, temperature and leaf moisture (SEWPaC, 2012b).	Species has previously been recorded approximately 3.5km south of study area.	**Likely:** Suitable habitat occurs within the study area and species has previously been recorded within 15 km.
Tachyglossus aculeatus	Short-beaked Echidna	-	SPL	Inhabits a wide range of terrestrial habitats wherever there are enough ants or termites, including desert, rainforest, open forest, bushland, farmland and suburban backyards (Menkhorst and Knight, 2011).	Species has previously been recorded within the study area.	**Known:** Species was recorded within the study area.

[1]**Status:** E: 'Endangered', V: 'Vulnerable', NT: 'Near Threatened', LC: 'Least Concern'. SPL: Special 'Least Concern'
[2]**Local Records:** Local records are defined as those occurring within a 10 km radius of the study areas. Sources include Queensland Herbarium (unpublished), ALA (2013), DEHP (2014 and Footprints (2012).
* Delisted from EPBC Act during the period of this study



EPBC Act Migratory Species Locations

Figure 4.4

Project:	Baralaba North Continued Operations Project
Client:	Cockatoo Coal Ltd
Compiled by: MR	Date: 25/02/2014
Approved by: GG	Date: 25/02/2014

Source: Base topographic data supplied by CCL & © Bing Aerials.

- Terrestrial Ecology Study Area
- Disturbance Footprint
- Approved Baralaba/Wonbindi North Mine
- Property Lot and Plan
- Waterway

Migratory Species

- Caspian Tern
- Cattle Egret
- Eastern Great Egret
- Glossy Ibis
- Rainbow Bee-eater
- Satin Flycatcher

0 0.5 1 2

Kilometres

Datum: GDA94

RPS

Rainbow Bee-eater was recorded on numerous occasions over both survey periods within Riparian Woodland and Eucalypt Open-forest, as well as within non-remnant areas within the study area. Satin Flycatcher was recorded on two occasions during the post summer season survey period, once within Disturbed *Acacia harpophylla* Palustrine Wetland habitat and within Riparian Woodland. These species are known to occur within numerous habitat types, including dry eucalypt forest, although wetland habitats are preferentially chosen due to the presence of ephemeral and/or permanent water sources (DotE, 2013t and DotE, 2013u).

Suitable foraging habitat for Rainbow Bee-eater and Satin Flycatcher is abundant throughout the study area, occurring mainly within Riparian Woodland and Eucalypt Open-forest habitat located near water. However, *Acacia harpophylla* Palustrine wetland habitat is also considered to provide foraging habitat for Satin Flycatcher (i.e. species was recorded within this habitat). In addition, suitable nesting habitat may be present within riparian communities located along the Dawson River and its associated tributaries. The sandy banks along the Dawson River provide suitable habitat for Rainbow Bee-eater to build nesting chambers, while the large trees within these communities provide nesting opportunities for Satin Flycatcher (DotE, 2013t and DotE, 2013u). These nesting resources are not limited to the study area.

Caspian Tern was recorded once during the post winter season survey, flying above Riparian Woodland within the northern portion of the study area. This species is usually found in coastal areas, but also occurs inland and is associated with wetlands. Wetland habitat within the study area would most likely provide foraging habitat for this species (DotE, 2013v). Glossy Ibis was also recorded only once during the post winter season survey. It was observed foraging within shallow wetland habitat within riparian areas in the north-western portion of the study area.

Suitable habitat for the remaining eight potentially occurring migratory species (identified by the desktop assessment) was observed to be located within the study area during field surveys.

Habitat for Latham's Snipe includes shallow terrestrial freshwater wetlands with fringing native vegetation, which is present within some areas of the *Acacia harpophylla* Palustrine Wetland habitat, Riparian Woodland (especially shallow wetland areas associated with the palustrine wetland (associated with the relict drainage line of the Dawson River) to the north and farm dams. Deep gilgais also provide foraging habitat for this species, as they provide optimal habitat for amphibians.

White-bellied Sea-Eagle can occur across a wide variety of habitats. Preferred habitat includes proximity to water and an abundance of large trees (DotE, 2013w). These characteristics are primarily restricted to riparian areas within the study area.

Rufous Fantail and Black-faced Monarch (*Monarcha melanopsis*) usually occur within wet sclerophyll and rainforest habitats (DotE, 2013x and DotE, 2013y), respectively. However, during periods of migration these species do commonly occur within dry sclerophyll forest. For this reason it is possible that Eucalypt Open-forest and Riparian habitat within the study area provides suitable transient habitat.

It is expected that Fork-tailed Swift (*Apus pacificus*) and White-throated Needletail (*Hirundapus caudacutus*) would only occur as flyovers within the study area. Fork-tailed Swift is almost exclusively aerial, flying from heights less than one metre to at least 300 m above the ground. In Australia, the species is mostly observed flying over inland plains, but can also occur above foothills or in coastal areas. It is most common over dry or open habitats (DotE, 2013z). White-throated Needletail is almost exclusively aerial within Australia, flying from less than one metre to over 1000 m above ground. This species is commonly recorded above wooded areas, but is also observed above cleared farmland (DotE, 2013aa).

4.5.3 Likelihood of Occurrence

Table 4.4 provides an assessment of the potential for each migratory species to occur in the study area based on their habitat requirements and the condition and array of available habitat. Six migratory species are known to occur in the study area; Eastern Great Egret, Cattle Egret, Rainbow Bee-eater, Satin Flycatcher, Caspian Tern and Glossy Ibis. There are also four species considered to be likely occurrences, including Latham's Snipe, White-bellied Sea-eagle, White-throated Needletail and Rufous Fantail, as well as two possible occurrences; Fork-tailed Swift and Black-faced Monarch. Of these species, White-throated Needletail and Fork-tailed Swift would only ever occur as flyovers.

Table 4.4: Likelihood of Occurrence for Migratory Fauna Listed under the EPBC Act

Scientific Name	Common Name	EPBC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence
Birds					
Apus pacificus	Fork-tailed Swift	MM	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher (DotE, 2013z). In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines. They forage aerially, up to hundreds of metres above ground, but also less than 1 m above open areas or over water. They often occur in areas of updraughts, especially around cliffs (DotE, 2013z).	Species has not been recorded within a 10 km buffer of study area	**Possible:** Species may occur as a flyover the study area.
Ardea modesta	Eastern Great Egret	MM & WM	The Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). These include swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. The species usually frequents shallow waters (DotE, 2013r). The Great Egret may retreat to permanent wetlands or coastal areas when other wetlands are dry (for example, during drought). This may occur annually in some regions with regular wet and dry seasons or erratically where the availability of wetland habitat is also erratic (DotE, 2013r).	Species has previously been recorded within the study area	**Known:** Species recorded within study area.

Scientific Name	Common Name	EPBC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence
Ardea ibis	Cattle Egret	MM & WM	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It has been recorded on earthen dam walls and ploughed fields. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. The Cattle Egret is known to follow earth-moving machinery and has been located at rubbish tips. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation (DotE, 2013s).	Species has previously been recorded within a 10 km buffer of the study area.	**Known:** Species recorded within study area.
Gallinago hardwickii	Latham's Snipe	WM	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (DotE, 2013ab).	Species has previously been recorded within the study area	**Likely:** Species has been recorded within 10 km of study area and suitable wetland habitat is present.
Haliaeetus leucogaster	White-bellied Sea-Eagle	TM	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats (DotE, 2013w). Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas (DotE, 2013w).	Species has previously been recorded within a 10 km buffer of the study area.	**Likely:** Species has been recorded within 10 km of study area and suitable wetland habitat is present.

Scientific Name	Common Name	EPBC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence
Hirundapus caudacutus	White-throated Needletail	MM	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (DotE, 2013aa).	Species has previously been recorded within a 10 km buffer of the study area.	**Likely:** Species has been recorded within 10 km of study area and may occur as a flyover.
Hydroprogne caspia	Caspian Tern	MM	Caspian Tern is usually found in sheltered coastal inlets, especially those with sandy or muddy margins. The species also occurs in near-coastal or inland terrestrial wetlands, including lakes, rivers and creeks as well as artificial areas (DotE, 2013v).	Species has not previously been recorded within a 10 km buffer of the study area.	**Known:** Species recorded within study area.
Merops ornatus	Rainbow Bee-eater	TM	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water (DotE, 2013t).	Species has previously been recorded within Study Area	**Known:** Species recorded across study area.
Monarcha melanopsis	Black-faced Monarch	TM	The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may also be found in more open woodland communities when migrating (DotE, 2013y).	Species has not been recorded within a 10 km buffer of the study area.	**Possible:** Species may occur transiently in Open Eucalypt-forest.
Myiagra cyanoleuca	Satin Flycatcher	TM	Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than the Leaden Flycatcher, *Myiagra rebecula*, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest (DotE, 2013u).	Species has previously been recorded within a 10 km buffer of the study area.	**Known:** Species recorded within study area.
Plegadis falcinellus	Glossy Ibis	MM	Preferred habitat for Glossy Ibis includes freshwater marshes at the edge of other wetland types, including lakes and rivers, swamps and reservoirs. The species is also occasional recorded within coastal areas. It roasts in trees or shrubs usually close to water bodies (DotE, 2013ad).	Species has not previously been recorded within a 10km buffer of the study area.	**Known:** Species recorded within study area.

Scientific Name	Common Name	EPBC Act Status[1]	Habitat	Local Records[2]	Likelihood of Occurrence
Rhipidura rufifrons	Rufous Fantail	TM	In north and north-east Australia, they often occur in tropical rainforest and monsoon rainforests, including semi-evergreen mesophyll vine forests, semi-deciduous vine thickets or thickets of Paperbarks. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including Spotted Gum (*Eucalyptus maculata*), Yellow Box (*E. melliodora*), ironbarks or stringybarks, often with a shrubby or heath understorey (DotE, 2013x)	Species has previously been recorded within a 10 km buffer of the study area.	**Likely:** Species has been recorded within 10 km of study area and may occur transiently within Eucalypt Open-forest.
Rostratula australis	Australian Painted Snipe	WM & V	Refer to **Table 4.3**	Refer to **Table 4.3**	Refer to **Table 4.3**
Reptiles					
Crocodylus porosus	Salt-water Crocodile	MM	Refer to **Table 4.3**	Refer to **Table 4.3**	Refer to **Table 4.3**

[1]**Status:** V: 'Vulnerable', MM: Marine Migratory, WM: Wetland Migratory, TM: Terrestrial Migratory.
[2]**Local Records:** Local records are defined as those occurring within a 10 km radius of the study areas. Sources include Queensland Herbarium (unpublished), ALA (2013) and DEHP (2014)

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Appendix 1

EPBC Act Protected Matters Report

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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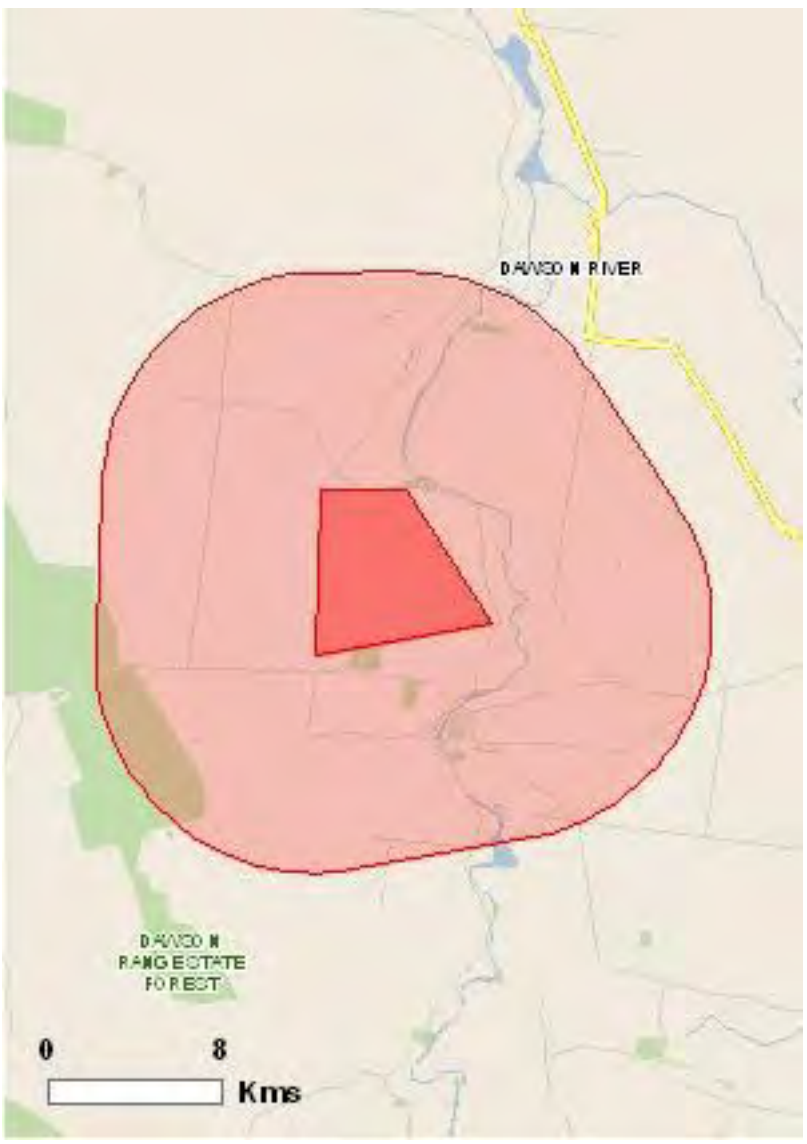

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 10.0Km

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	17
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	14
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Poephila cincta cincta Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Cadellia pentastylis Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma torquata Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat likely to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Paradelma orientalis Brigalow Scaly-foot [59134]	Vulnerable	Species or species habitat likely to occur within area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle [1761]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat likely to occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat likely to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
[Anseranas semipalmata](#) Magpie Goose [978]		Species or species habitat may occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat likely to occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat likely to occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area
Reptiles		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Frogs		
Bufo marinus		
Cane Toad [1772]		Species or species habitat likely to occur within area
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica		
Prickly Acacia [6196]		Species or species habitat may occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis		
Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Coordinates

-24.0822 149.75545,-24.08205 149.79143,-24.13662 149.82709,-24.15007 149.75272,
-24.0822 149.75545

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Acknowledgements

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

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

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

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

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Appendix 2

Wildlife Online Report

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 24.0651 to 24.1366
Longitude: 149.7512 to 149.8271
Email: gabe.otter@rpsgroup.com.au
Date submitted: Wednesday 13 Mar 2013 12:06:30
Date extracted: Wednesday 13 Mar 2013 12:10:10

The number of records retrieved = 106

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Acanthizidae	*Gerygone albogularis*	white-throated gerygone		C		1
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		1
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		3
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		1
animals	birds	Accipitridae	*Circus approximans*	swamp harrier		C		2
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		1
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		1
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		2
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		2
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		2
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		1
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		2
animals	birds	Ardeidae	*Ardea modesta*	eastern great egret		C		3
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		3
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		3
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		1
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		1
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		1
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		3
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		1
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		2
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		3
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		1
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		1
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		2
animals	birds	Climacteridae	*Climacteris picumnus*	brown treecreeper		C		1
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		1
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		1
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	2
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		1
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		1
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		1
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		1
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		1
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		1
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		1
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		1
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		1
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	*Chalcites minutillus minutillus*	little bronze-cuckoo		C		1
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		1
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		1
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		1
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		1
animals	birds	Gruidae	*Grus rubicunda*	brolga		C		1
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		3
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		1
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		1
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		1
animals	birds	Jacanidae	*Irediparra gallinacea*	comb-crested jacana		C		2
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		1
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		1
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		1
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		1
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		1
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		1
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		1
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		3
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		1
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		1
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		1
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		1
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		1
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		1
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		1
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		2
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		2
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		1
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		1
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		1
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		1
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		1
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		1
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		1
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		1
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		2
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		2
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		2
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		2
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		1
animals	bony fish	Ambassidae	*Ambassis agassizii*	Agassiz's glassfish				1
animals	bony fish	Apogonidae	*Glossamia aprion*	mouth almighty				1
animals	bony fish	Ariidae	*Neoarius graeffei*	blue catfish				1
animals	bony fish	Belonidae	*Strongylura krefftii*	freshwater longtom				1
animals	bony fish	Clupeidae	*Nematalosa erebi*	bony bream				1
animals	bony fish	Eleotridae	*Philypnodon grandiceps*	flathead gudgeon				1
animals	bony fish	Eleotridae	*Oxyeleotris lineolata*	sleepy cod				1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	bony fish	Eleotridae	*Hypseleotris compressa*	empire gudgeon				1
animals	bony fish	Eleotridae	*Hypseleotris species 1*	Midgley's carp gudgeon				1
animals	bony fish	Melanotaeniidae	*Melanotaenia splendida splendida*	eastern rainbowfish				1
animals	bony fish	Osteoglossidae	*Scleropages leichardti*	southern saratoga				1
animals	bony fish	Percichthyidae	*Macquaria ambigua*	golden perch				1
animals	bony fish	Plotosidae	*Tandanus tandanus*	freshwater catfish				1
animals	bony fish	Terapontidae	*Amniataba percoides*	barred grunter				1
animals	bony fish	Terapontidae	*Scortum hillii*	leathery grunter				1
plants	higher dicots	Cactaceae	*Cylindropuntia imbricata*	devil's rope cactus	Y			1/1
plants	higher dicots	Caesalpiniaceae	*Lysiphyllum hookeri*	Queensland ebony		C		1/1
plants	higher dicots	Chenopodiaceae	*Sclerolaena birchii*	galvanised burr		C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia dallachyana*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria juncea*	sunhemp	Y			1/1
plants	monocots	Poaceae	*Leersia hexandra*	swamp rice grass		C		1/1

CODES

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

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

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

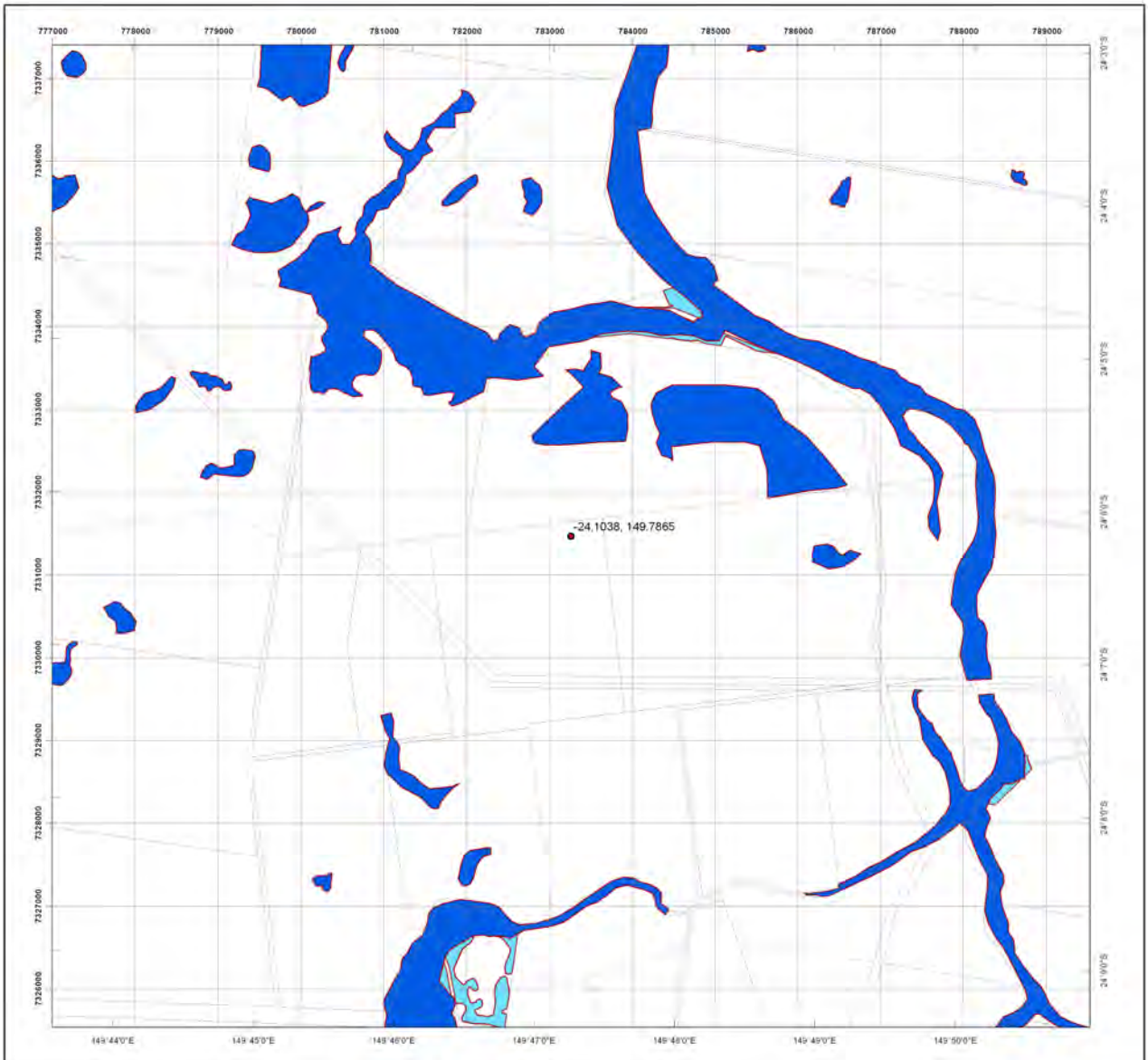
Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix 3

Regulated Vegetation Management Map and Supporting Map

15/01/2014 11:02:52

Longitude: '149.7865' Latitude: '-24.1038'



Regulated Vegetation Management Map

Legend

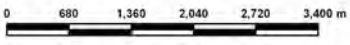
- Coordinates
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Vegetation not regulated under the VMA)
- Water
- Area not categorised
- Cadastral line
- Property boundaries shown are provided as a locational aid only

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

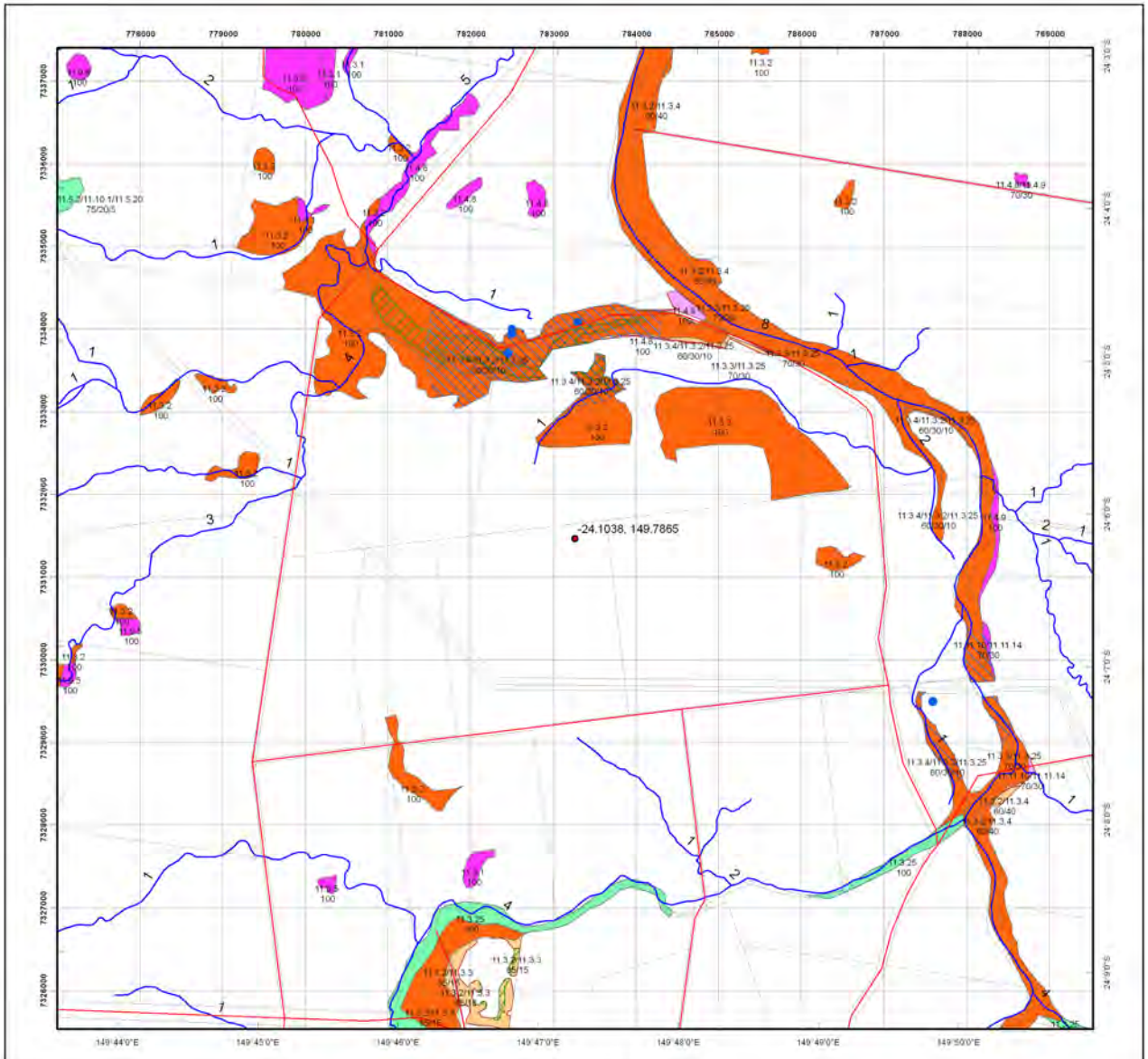
Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.



This product is projected into:
GDA 1994 MGA Zone 55



Vegetation Management Supporting Map

Legend

- Coordinates
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
  These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map
  (Stream order shown as black number against stream where available)
- Roads
  © Pitney Bowes Software Pty Ltd
- National Parks, State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only

LOCALITY DIAGRAM

N

0 490 980 1,470 1,960 2,450 m

This product is projected into:
GDA 1994 MGA Zone 55

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the vegetation management watercourse map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

Vegetation Management Act 1999 - Extract from the essential habitat database - version 4.0

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - Module 8: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Sustainable Planning Act 2009*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s or on and within 2.2 km of an identified coordinate on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources and Mines website (http://www.dnrm.qld.gov.au) has more information on how the layer is applied under the State Development Assessment Provisions - Module 8: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

(a) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or

(b) in which the protected wildlife, at any stage of its life cycle, is located.

Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1994*.

Essential habitat in Category A and B (Remnant vegetation species record) areas:2200m Species Information - (no results)

Essential habitat in Category A and B (Remnant vegetation species record) areas:2200m Regional Ecosystems Information - (no results)

Essential habitat in Category A and B (Remnant vegetation) areas:2200m Species Information - (no results)

Essential habitat in Category A and B (Remnant vegetation) areas:2200m Regional Ecosystems Information - (no results)

Essential habitat in Category C (High value regrowth vegetation) areas:2200m Species Information - (no results)

Essential habitat in Category C (High value regrowth vegetation) areas:2200m Regional Ecosystems Information - (no results)

Appendix 4

Biocondition Data

Derived Benchmarks

RE 11.3.3

Benchmark Condition	Reference	Survey Site
Number of large trees	BOO site	BEB04
Canopy height	BOO site	BEB04
Recruitment of canopy species	NA	NA
EDL cover	BOO site	BEB04
Shrub cover	BOO site	BEB04
Abundance of CWD	BOO site	BEB04
Native tree species richness	BOO site	BEB04
Native shrub species richness	BOO site	BEB04
Native grass species richness	BOO site	BEB04
Native forbs/other species richness	BOO site	BEB04
Non-native plant cover	NA	NA
Native perennial grass cover	BOO site	BEB04
Organic litter cover	BOO site	BEB04

RE 11.3.27

Benchmark Condition	Reference	Survey Site
Number of large trees	BOO site	BNorth NE01
Canopy height	BOO site	BNorth NE01
Recruitment of canopy species	NA	NA
EDL cover	BOO site	BNorth NE01
Shrub cover	BOO site	BNorth NE01
Abundance of CWD	BOO site	BNorth NE01
Native tree species richness	BOO site	BNorth NE01
Native shrub species richness	BOO site	BNorth NE01
Native grass species richness	BOO site	BNorth NE01
Native forbs/other species richness	BOO site	BNorth NE01
Non-native plant cover	NA	NA
Native perennial grass cover	BOO site	BNorth NE01
Organic litter cover	BOO site	BNorth NE01

RE 11.4.8

Benchmark Condition	Reference	Survey Site
Number of large trees	BOO site	AB03
Canopy height	Technical Description	NA
Recruitment of canopy species	NA	NA
EDL cover	Technical Description	NA
Shrub cover	Technical Description	NA
Abundance of CWD	BOO site	AB03
Native tree species richness	BOO site	AB03
Native shrub species richness	BOO site	AB03
Native grass species richness	BOO site	AB03
Native forbs/other species richness	BOO site	AB03
Non-native plant cover	NA	NA
Native perennial grass cover	Technical Description	NA
Organic litter cover	BOO site	AB03

RE 11.4.8a

Benchmark Condition	Reference	Survey Site
Number of large trees	BOO site	TLO B1
Canopy height	Technical Description	NA
Recruitment of canopy species	NA	NA
EDL cover	Technical Description	NA
Shrub cover	Technical Description	NA
Abundance of CWD	BOO site	TLO B1
Native tree species richness	BOO site	TLO B1
Native shrub species richness	BOO site	TLO B1
Native grass species richness	BOO site	TLO B1
Native forbs/other species richness	BOO site	TLO B1
Non-native plant cover	NA	NA
Native perennial grass cover	Technical Description	NA
Organic litter cover	BOO site	TLO B1

RE 11.5.5

Benchmark Condition	Reference	Survey Site
Number of large trees	BOO site	LHB01
Canopy height	BOO site	LHB01
Recruitment of canopy species	NA	NA
EDL cover	BOO site	LHB01
Shrub cover	BOO site	LHB01
Abundance of CWD	BOO site	LHB01
Native tree species richness	BOO site	LHB01
Native shrub species richness	BOO site	LHB01
Native grass species richness	BOO site	LHB01
Native forbs/other species richness	BOO site	LHB01
Non-native plant cover	NA	NA
Native perennial grass cover	BOO site	LHB01
Organic litter cover	BOO site	LHB01

RE 11.5.9

Benchmark Condition	Reference	Survey Site
Number of large trees	BOO site	HB01
Canopy height	Technical Description (11.5.1 / BVG 18b)	HB01
Recruitment of canopy species	NA	NA
EDL cover	Technical Description (11.5.1 / BVG 18b)	HB01
Shrub cover	Technical Description (11.5.1 / BVG 18b)	HB01
Abundance of CWD	BOO site	HB01
Native tree species richness	BOO site	HB01
Native shrub species richness	BOO site	HB01
Native grass species richness	BOO site	HB01
Native forbs/other species richness	BOO site	HB01
Non-native plant cover	NA	NA
Native perennial grass cover	Technical Description (11.5.1 / BVG 18b)	HB01
Organic litter cover	BOO site	HB01

BioCondition Calculations

RE 11.3.1 HVR / BEB02

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Bases Attributes				
Large trees	170	14	8%	5
Tree canopy height	14	13	93%	5
Recruitment of canopy species (%)	-	50	50%	3
Tree canopy cover (%)	29	13.2	46%	2
Shrub cover (%)	8	0.6	8%	0
Coarse woody debris	1752	390	22%	2
Native plant species richness				
Trees	3	7	233%	5
Shrubs	5	8	160%	5
Grasses	4	3	75%	2.5
Other	8	2	25%	2.5
Non-native plant cover (%)	-	80	80%	0
Native perennial grass species cover	8	14	175%	5
Organic percentage litter	34	19	56%	3
Total Site Based				**40**
Landscape scale attributes				
Size of patch (Manually input score)	-	3.3	-	3.3
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**3.3**
Total BC Score				**43.3**

RE 11.3.1 HVR / HB03

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Bases Attributes				
Large trees	170	0	0%	0
Tree canopy height	14	8	57%	3
Recruitment of canopy species (%)	-	25	25%	3
Tree canopy cover (%)	29	49.3	170%	5
Shrub cover (%)	8	0	0%	0
Coarse woody debris	1752	200	11%	2
Native plant species richness				
Trees	3	4	133%	5
Shrubs	5	5	100%	5
Grasses	4	3	75%	2.5
Other	8	4	50%	2.5
Non-native plant cover (%)	-	85	85%	0
Native perennial grass species cover	8	6	75%	3
Organic percentage litter	34	38	112%	3
Total Site Based				**34**
Landscape scale attributes				
Size of patch (Manually input score)	-	3.3	-	3.3
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**3.3**
Total BC Score				**37.3**

RE 11.3.1 Disturbed HVR / BEB01

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Bases Attributes				
Large trees	170	1	1%	5
Tree canopy height	14	12	86%	5
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	29	6.8	23%	2
Shrub cover (%)	8	0	0%	0
Coarse woody debris	1752	420	24%	2
Native plant species richness				
Trees	3	4	133%	5
Shrubs	5	0	0%	0
Grasses	4	2	50%	2.5
Other	8	4	50%	2.5
Non-native plant cover (%)	-	100	100%	0
Native perennial grass species cover	8	2	25%	1
Organic percentage litter	34	12	35%	3
Total Site Based				**33**
Landscape scale attributes				
Size of patch (Manually input score)	-	5	-	5
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**5**
Total BC Score				**38**

RE 11.3.1 Remnant / HB04

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Bases Attributes				
Large trees	170	8	5%	5
Tree canopy height	14	17	121%	5
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	29	15.8	54%	5
Shrub cover (%)	8	0	0%	0
Coarse woody debris	1752	235	13%	2
Native plant species richness				
Trees	3	3	100%	5
Shrubs	5	1	20%	0
Grasses	4	1	25%	2.5
Other	8	14	175%	5
Non-native plant cover (%)	-	60	60%	0
Native perennial grass species cover	8	5	63%	3
Organic percentage litter	34	12.2	36%	3
Total Site Based				**40.5**
Landscape scale attributes				
Size of patch (Manually input score)	-	6.6	-	6.6
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**6.6**
Total BC Score				**47.1**

RE 11.3.2 Remnant / AB05

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	22	19	86%	10
Tree canopy height	18	17	94%	5
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	40	49.2	123%	5
Shrub cover (%)	2	8.9	445%	5
Coarse woody debris	307	190	62%	2
Native plant species richness				
Trees	2	7	350%	5
Shrubs	2	10	500%	5
Grasses	9	8	89%	2.5
Other	17	8	47%	2.5
Non-native plant cover (%)	-	40	40%	3
Native perennial grass species cover	35	26	74%	3
Organic percentage litter	30	38	127%	3
Total Site Based				**56**
Landscape-scale attributes				
Size of patch (Manually input score)	-	10	-	10
Connectivity (l,m,h or vh)	-	m	-	2
Landscape context (l,m,h or vh)	-	m	-	2
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**14**
Total BC Score				**70**

RE 11.3.3 HVR / HB05

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	34	10	29%	5
Tree canopy height	22	10	45%	3
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	46.3	49.7	107%	5
Shrub cover (%)	1	0	0%	0
Coarse woody debris	680	220	32%	2
Native plant species richness				
Trees	2	5	250%	5
Shrubs	1	3	300%	5
Grasses	3	5	167%	5
Other	8	11	138%	5
Non-native plant cover (%)	-	20	20%	5
Native perennial grass species cover	54	77.4	143%	5
Organic percentage litter	22	12	55%	3
Total Site Based				53
Landscape-scale attributes				
Size of patch (Manually input score)	-	3.3	-	3.3
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**3.3**
Total BC Score				**56.3**

RE 11.3.3 Disturbed Remnant / LHB02

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	34	22	65%	10
Tree canopy height	22	22	100%	5
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	46.3	40.5	87%	5
Shrub cover (%)	1	0	0%	0
Coarse woody debris	680	272	40%	2
Native plant species richness				
Trees	2	1	50%	2.5
Shrubs	1	1	100%	5
Grasses	3	2	67%	2.5
Other	8	3	38%	2.5
Non-native plant cover (%)	-	60	60%	0
Native perennial grass species cover	54	17.6	33%	1
Organic percentage litter	22	21	95%	3
Total Site Based				**43.5**
Landscape-scale attributes				
Size of patch (Manually input score)	-	8.6	-	8.6
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**8.6**
Total BC Score				**52.1**

RE 11.3.3 Remnant / BEB04

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	34	34	100%	10
Tree canopy height	22	22	100%	5
Recruitment of canopy species (%)	-	0	0%	0
Tree canopy cover (%)	46.3	46.3	100%	5
Shrub cover (%)	1	0	0%	0
Coarse woody debris	680	680	100%	2
Native plant species richness				
Trees	2	2	100%	5
Shrubs	1	1	100%	5
Grasses	3	3	100%	5
Other	8	8	100%	5
Non-native plant cover (%)	-	20	20%	5
Native perennial grass species cover	54	54	100%	5
Organic percentage litter	22	22	100%	3
Total Site Based				**55**
Landscape-scale attributes				
Size of patch (Manually input score)	-	10	-	10
Connectivity (l,m,h or vh)	-	m	-	2
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**12**
Total BC Score				**67**

RE 11.3.27 Remnant / NE01

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	9	9	100%	15
Tree canopy height	25	25	100%	5
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	25.3	25.3	100%	5
Shrub cover (%)	6.4	6.4	100%	3
Coarse woody debris	77	77	100%	2
Native plant species richness				
Trees	2	2	100%	5
Shrubs	2	2	100%	5
Grasses	5	5	100%	5
Other	3	3	100%	5
Non-native plant cover (%)		5	5%	5
Native perennial grass species cover	7.4	7.4	100%	5
Organic percentage litter	69	69	100%	3
Total Site Based				**68**
Landscape-scale attributes				
Size of patch (Manually input score)	-	2	-	2
Connectivity (l,m,h or vh)	-	m	-	2
Landscape context (l,m,h or vh)	-	m	-	2
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**6**
Total BC Score				**74**

RE 11.4.8 Remnant / AB03

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	18	17	94%	10
Tree canopy height	14.9	11	74%	5
Recruitment of canopy species (%)	-	50	50%	3
Tree canopy cover (%)	31.5	50.3	160%	5
Shrub cover (%)	6	8	133%	3
Coarse woody debris	968	968	100%	2
Native plant species richness				
Trees	6	6	100%	5
Shrubs	8	8	100%	5
Grasses	3	3	100%	5
Other	10	10	100%	5
Non-native plant cover (%)	-	100	100%	0
Native perennial grass species cover	43.3	0	0%	0
Organic percentage litter	26	26	100%	3
Total Site Based				**51**
Landscape-scale attributes				
Size of patch (Manually input score)	-	1.75	-	2
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**1.75**
Total BC Score				**52.75**

RE 11.4.8a HVR / BEB03

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	40	10	25%	5
Tree canopy height	14.9	9	60%	3
Recruitment of canopy species (%)	-	100	100%	5
Tree canopy cover (%)	31.5	15	48%	2
Shrub cover (%)	6	0	0%	0
Coarse woody debris	640	50	8%	0
Native plant species richness				
Trees	1	1	100%	5
Shrubs	1	4	400%	5
Grasses	2	3	150%	5
Other	8	10	125%	5
Non-native plant cover (%)	-	60	60%	0
Native perennial grass species cover	13	3	23%	1
Organic percentage litter	39	18	46%	3
Total Site Based				**39**
Landscape-scale attributes				
Size of patch (Manually input score)	-	2.6	-	2.6
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**2.6**
Total BC Score				**41.6**

RE 11.4.8a Remnant / HB02

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	40	8	20%	5
Tree canopy height	14.9	16	107%	5
Recruitment of canopy species (%)	-	50	50%	3
Tree canopy cover (%)	31.5	16.7	53%	5
Shrub cover (%)	6	6	100%	3
Coarse woody debris	640	1170	183%	2
Native plant species richness				
Trees	1	5	500%	5
Shrubs	1	5	500%	5
Grasses	2	4	200%	5
Other	8	9	113%	5
Non-native plant cover (%)	-	50	50%	0
Native perennial grass species cover	13	3.4	26%	1
Organic percentage litter	39	17.4	45%	3
Total Site Based				**47**
Landscape-scale attributes				
Size of patch (Manually input score)	-	4	-	4
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**4**
Total BC Score				**51**

RE 11.5.5 HVR / AB02

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	26	4	15%	5
Tree canopy height	22	11	50%	3
Recruitment of canopy species (%)	-	50	50%	3
Tree canopy cover (%)	22.5	35.6	158%	5
Shrub cover (%)	18.9	2.6	14%	3
Coarse woody debris	70	70	100%	2
Native plant species richness				
Trees	5	5	100%	5
Shrubs	12	4	33%	2.5
Grasses	7	4	57%	2.5
Other	8	7	88%	2.5
Non-native plant cover (%)	-	70	70%	0
Native perennial grass species cover	13	1	8%	0
Organic percentage litter	27	5.4	20%	3
Total Site Based				**36.5**
Landscape-scale attributes				
Size of patch (Manually input score)	-	5	-	5
Connectivity (l,m,h or vh)	-	l	-	0
Landscape context (l,m,h or vh)	-	m	-	2
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**7**
Total BC Score				**43.5**

RE 11.5.5 Remnant / LHB1

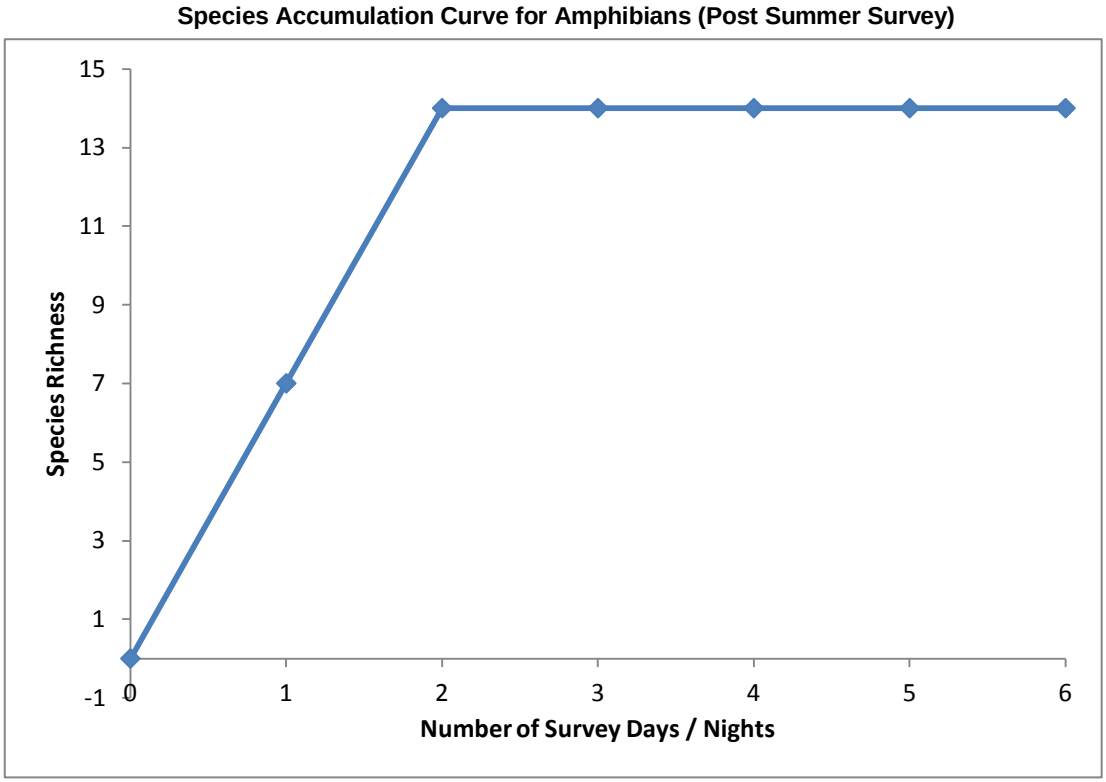
Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	26	25	96%	10
Tree canopy height	22	22	100%	5
Recruitment of canopy species (%)	-	25	25%	3
Tree canopy cover (%)	22.5	22.5	100%	5
Shrub cover (%)	18.9	18.9	100%	3
Coarse woody debris	70	70	100%	2
Native plant species richness				
Trees	5	5	100%	5
Shrubs	12	12	100%	5
Grasses	7	7	100%	5
Other	8	8	100%	5
Non-native plant cover (%)	-	80	80%	0
Native perennial grass species cover	13	13	100%	5
Organic percentage litter	27	27	100%	3
Total Site Based				**56**
Landscape-scale attributes				
Size of patch (Manually input score)	-	3.2	-	3.2
Connectivity (l,m,h or vh)	-	m	-	2
Landscape context (l,m,h or vh)	-	m	-	2
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**7.2**
Total BC Score				**63.2**

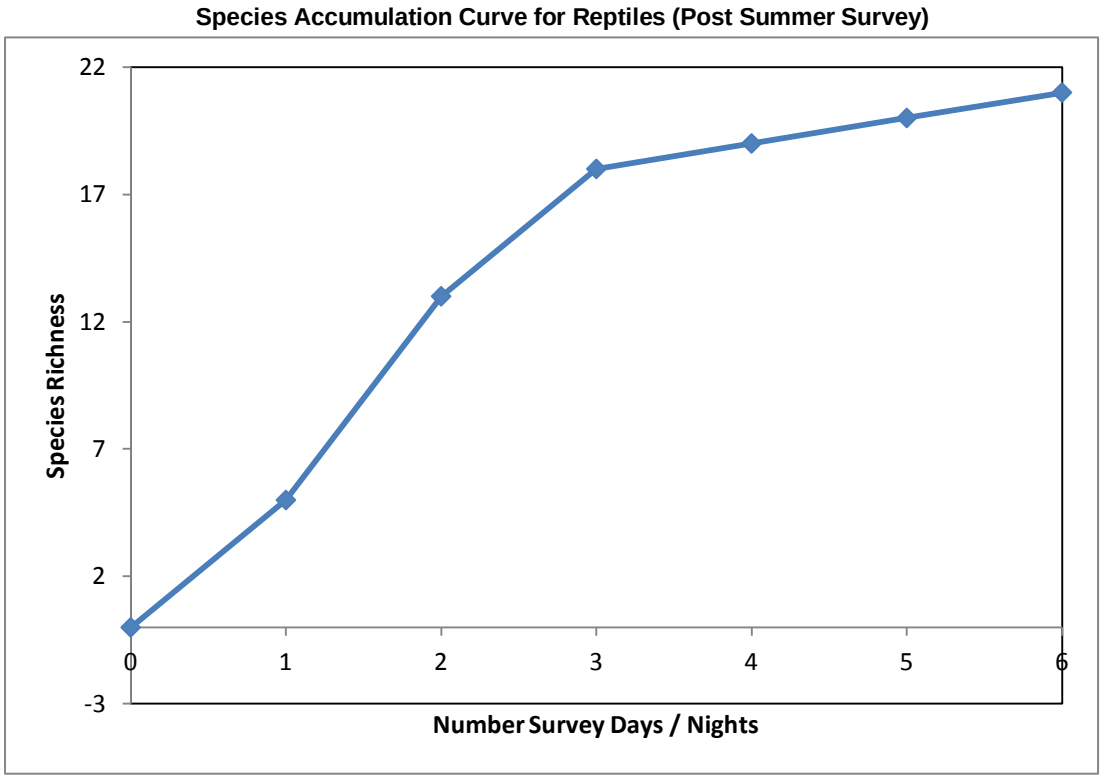
RE 11.5.9 Remnant / HB01

Parameter	Benchmark Value	Site Data	Percentage	Score
Site Based Attributes				
Large trees	22	21	95%	10
Tree canopy height	19.4	19	98%	5
Recruitment of canopy species (%)	-	50	50%	3
Tree canopy cover (%)	27.9	47.6	171%	5
Shrub cover (%)	12.3	6.15	50%	3
Coarse woody debris	345	345	100%	2
Native plant species richness				
Trees	8	8	100%	5
Shrubs	14	14	100%	5
Grasses	7	7	100%	5
Other	7	7	100%	5
Non-native plant cover (%)		87.5	88%	0
Native perennial grass species cover	24	4.6	19%	1
Organic percentage litter	19	19	100%	3
Total Site Based				**52**
Landscape-scale attributes				
Size of patch (Manually input score)	-	5	-	5
Connectivity (l,m,h or vh)	-	m	-	2
Landscape context (l,m,h or vh)	-	l	-	0
OR				
Distance to water source (km) (Default 0.1 if not using distance)	-	0.1	-	0
Total Landscape				**7**
Total BC Score				**59**

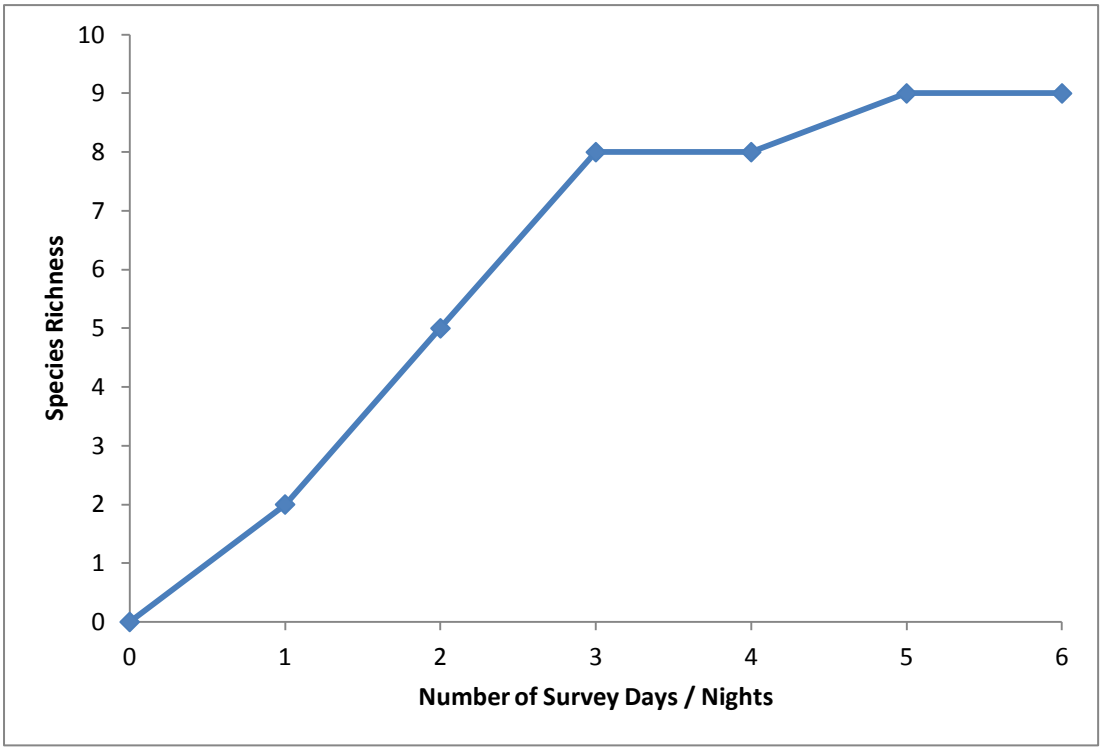
Appendix 5

Species Accumulation Curves

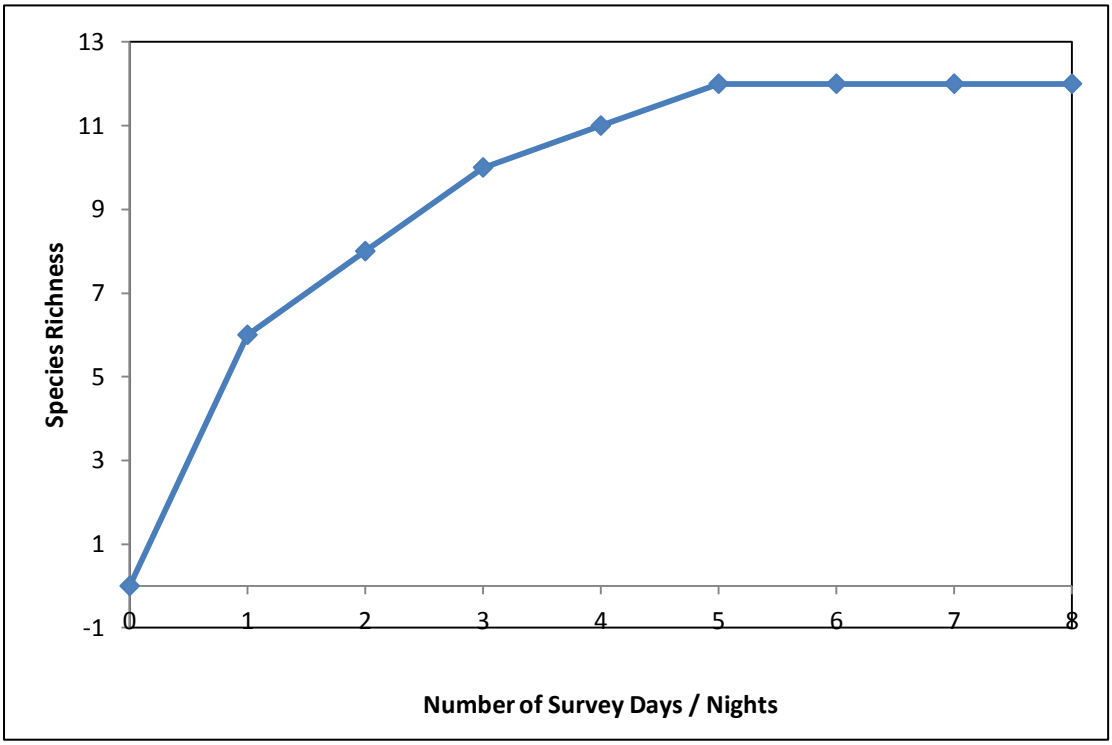

Species Accumulation Curve for Amphibians (Post Summer Survey)
Species Richness
15
13
11
9
7
5
3
1
-1
0
1
2
3
4
5
6
Number of Survey Days / Nights


Species Accumulation Curve for Reptiles (Post Summer Survey)
Species Richness
22
17
12
7
2
-3
0
1
2
3
4
5
6
Number Survey Days / Nights

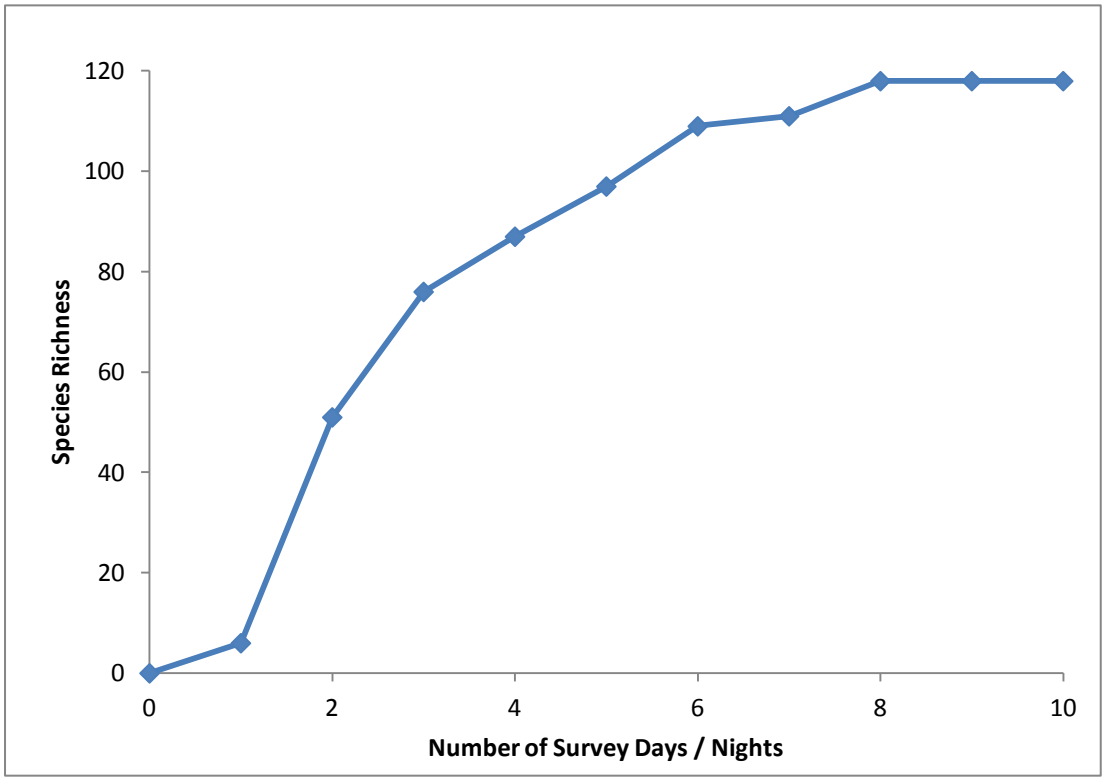
Species Accumulation Curve for Mammals (excluding Bats) (Post Summer Survey)



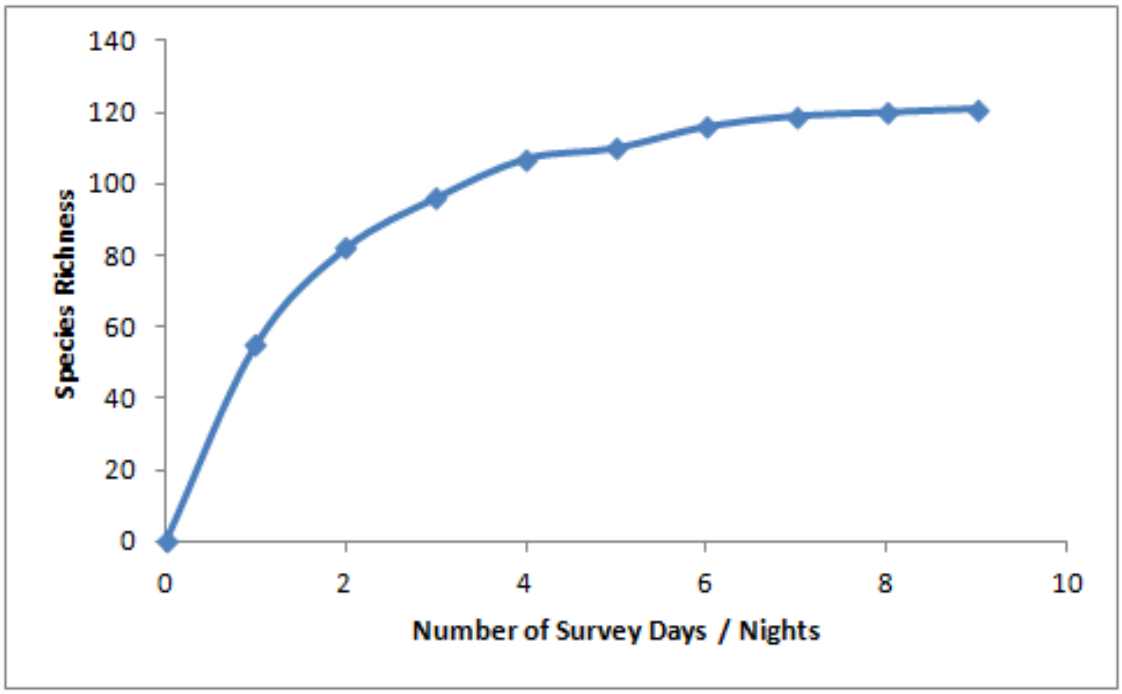
Species Accumulation Curve for Bats (Post Summer Survey)



Species Accumulation Curve for Avifauna (Post Summer Survey)



Species Accumulation Curve for Avifauna (Post Winter Survey)



Appendix 6

Site Flora Species List

Family	Scientific Name	Common Name	NC Act Status
Acanthaceae	*Rostellularia adscendens*	Pink Tongues	Least Concern
Aizoaceae	*Trianthema tetragonioides*	New Zealand Spinach	Least Concern
Alismataceae	*Caldesia oligococca*	-	Least Concern
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	Least Concern
Apocynaceae	*Alstonia constricta*	Bitter Bark, Quinine Tree, Quinine Bush	Least Concern
	Carissa ovata	Currant Bush	Least Concern
	Parsonsia lanceolata	Rough Silkpod	Least Concern
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	Least Concern
Capparaceae	*Capparis lasiantha*	Nepine	Least Concern
	Capparis loranthifolia var. *loranthifolia*	Narrow-leaf Bumble	Least Concern
Casuarinaceae	*Allocasuarina luehmannii*	Buloke	Least Concern
	Casuarina cristata	Belah	Least Concern
Celastraceae	*Denhamia oleaster*	Stiff Denhamia	Least Concern
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	Least Concern
	Enchylaena tomentosa	Ruby Saltbush	Least Concern
	Sclerolaena birchii	Galvanised Burr	Least Concern
	Sclerolaena tetracuspis	Brigalow Burr	Least Concern
Combretaceae	*Terminalia oblongata*	Yellow-wood	Least Concern
Convolvulaceae	*Cuscuta* sp.	Dodder Vine	Least Concern
Cupressaceae	*Callitris glaucophylla*	White Cypress Pine	Least Concern
Cyperaceae	*Cyperus difformis*	Variable Flatsedge	Least Concern
	Cyperus exaltatus	Umbrella Sedge	Least Concern
	Cyperus gracilis	Slender Flatsedge	Least Concern
	Cyperus haspan	Haspan Flatsedge	Least Concern
	Cyperus sp.	-	Least Concern
	Fimbristylis sp.	-	Least Concern
Droseraceae	*Drosera binata*	Fork-leaved Sundew	Least Concern
Ebenaceae	*Diospyros humilis*	Queensland Ebony	Least Concern
Euphorbiaceae	*Acalypha capillipes*	Small-leaved Acalypha	Least Concern
	Petalostigma pubescens	Bitter Bark	Least Concern
Fabaceae	*Cullen tenax*	Emu Foot	Least Concern
	Hovea lanceolata	Lance-leaf Hovea	Least Concern
	Hovea longipes	Brush Hovea	Least Concern
	Lysiphyllum carronii	Red Bauhinia	Least Concern
Juncaceae	*Juncus usitatus*	Common Rush	Least Concern
Lamiaceae	*Basilicum polystachyon*	Musk Basil	Least Concern
Lauraceae	*Cassytha pubescens*	Dodder Laurel	Least Concern
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	Least Concern

Malvaceae	*Abutilon oxycarpum*	Flannel Flower	Least Concern
	Abutilon oxycarpum subsp. *subsagittatum*	-	Least Concern
	Abutilon sp.	-	Least Concern
	Brachychiton rupestris	Queensland Bottle Tree	Least Concern
	Sida filiformis	Fine Sida	Least Concern
	Sida subspicata	Spiked Sida	Least Concern
Marsileaceae	*Marsilea drummondii*	Common Nardoo	Least Concern
Meliaceae	*Owenia venosa*	Crow's Apple	Least Concern
Mimosaceae	*Acacia bidwillii*	Corkwood Wattle	Least Concern
	Acacia excelsa	Ironwood	Least Concern
	Acacia harpophylla	Brigalow	Least Concern
	Acacia salicina	Sally Wattle	Least Concern
Moraceae	*Ficus opposita*	Sandpaper Fig	Least Concern
Myoporaceae	*Eremophila mitchellii*	False Sandalwood	Least Concern
Myrtaceae	*Corymbia dallachiana*	Dallachy's Gum	Least Concern
	Corymbia intermedia	Pink Bloodwood	Least Concern
	Corymbia tessellaris	Moreton Bay Ash	Least Concern
	Eremophila debilis	Winter Apple	Least Concern
	Eucalyptus cambageana	Dawson River Blackbutt	Least Concern
	Eucalyptus coolabah	Coolibah	Least Concern
	Eucalyptus melanophloia	Silver-leaved Ironbark	Least Concern
	Eucalyptus populnea	Poplar Box	Least Concern
	Eucalyptus tereticornis	Queensland Blue Gum	Least Concern
	Lophostemon suaveolens	Swamp Box	Least Concern
	Melaleuca trichostachya	River Paper-bark	Least Concern
Oleaceae	*Jasminum didymum subsp. racemosum*	Native Jasmine	Least Concern
Onagraceae	*Ludwigia peploides subsp. montevidensis*	Water Primrose	Least Concern
Orchidaceae	*Cymbidium canaliculatum*	Black Orchid	Least Concern
Phyllanthaceae	*Phyllanthus* sp.	-	Least Concern
Pittosporaceae	*Bursaria incana*	Prickly Pine	Least Concern
	Pittosporum spinescens	Wallaby Apple	Least Concern
Poaceae	*Alloteropsis semialata*	Cockatoo Grass	Least Concern
	Aristida calycina	Dark Wiregrass	Least Concern
	Aristida caput-medusae	Many-headed Wiregrass	Least Concern
	Aristida sp.	-	Least Concern
	Bothriochloa sp.	-	Least Concern
	Cymbopogon refractus	Barbed Wire Grass	Least Concern
	Cynodon dactylon	Green Couch	Least Concern

	Dactyloctenium radulans	Button Grass	Least Concern
	Dichanthium sericeum	Queensland Bluegrass	Least Concern
	Enneapogon gracilis	Slender Nineawn	Least Concern
	Entolasia stricta	Wiry Panic	Least Concern
	Eragrostis sororia	Woodland Lovegrass	Least Concern
	Eragrostis sp.	-	Least Concern
	Heteropogon contortus	Black Speargrass	Least Concern
	Isachne globosa	Swamp Millet	Least Concern
	Ottochloa gracillima	Graceful Grass	Least Concern
	Panicum decompositum var. *decompositum*	Native Millet	Least Concern
	Panicum queenslandicum	Coolabah Grass	Least Concern
	Paspalidium caespitosum	Brigalow Grass	Least Concern
	Perotis rara	Comet Grass	Least Concern
	Sporobolus caroli	Fairy Grass	Least Concern
	Themeda triandra	Kangaroo Grass	Least Concern
Polygonaceae	*Muehlenbeckia florulenta*	-	Least Concern
	Persicaria decipiens	Slender Knotweed	Least Concern
Proteaceae	*Hakea lorea*	Bootlace Oak	Least Concern
	Persoonia lanceolata	Lance Leaf Geebung	Least Concern
Pteridaceae	*Cheilanthes sieberi*	Mulga Fern	Least Concern
Rhaminaceae	*Alphitonia excelsa*	Red Ash	Least Concern
	Ventilago viminalis	Vine Tree	Least Concern
Rubiaceae	*Psydrax odorata*	Shiny-leaved Canthium, Lamboto	Least Concern
	Psydrax oleifolia	Myrtle Tree	Least Concern
Rutaceae	*Citrus glauca*	Desert Lime	Least Concern
	Flindersia australis	Crow's Ash	Least Concern
	Geijera parviflora	Wilga	Least Concern
Sapindaceae	*Alectryon diversifolius*	Scrub Boonaree	Least Concern
	Atalaya hemiglauca	Whitewood	Least Concern
	Dodonaea sp.	-	Least Concern
Solanaceae	*Solanum* sp.	-	Least Concern
Tiliaceae	*Grewia latifolia*	Dysentery Plant	Least Concern
Vitaceae	*Tetrastigma nitens*	Native Grape	Least Concern

Introduced Flora Species List			
Family	**Scientific Name**	**Common Name**	**Status[1]**
Aizoaceae	*Trianthema portulacastrum*	Black Pigweed	
Amaranthaceae	*Alternanthera pungens*	Khaki Weeds	
	Gomphrena celosioides	Gomphrena Weed	
Asteraceae	*Bidens pilosa*	Cobblers Pegs	
	Conyza bonariensis	Flax-leaf Fleabane	
	Pseudognaphalium luteoalbum	Jersey Cudweed	
	Senecio madagascariensis	Fireweed	Class 2
	Sonchus oleraceus	Milk Thistle	
	Xanthium pungens	Noogoora Burr	
Brassicaceae	*Lepidium africanum*	Common Peppercress	
Cactaceae	*Opuntia tomentosa*	Velvety Tree Pear	WoNS
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	Environmental
Crassulaceae	*Bryophyllum delagoense*	Mother of Millions	Class 2
Cucurbitaceae	*Citrullus* sp.	Wild Melon	
Euphorbiaceae	*Chamaesyce prostrata*	Red Caustic Weed	
Fabaceae	*Crotalaria trifoliastrum*	Trefoil Rattlepod	
	Leucaena leucocephala	Coffee Bush	
	Macroptilium lathyroides	Phasey Bean	
	Stylosanthes humilis	Townsville lucerne	
Malvaceae	*Sida cordifolia*	Flannel Weed	
	Sida rhombifolia	Paddy's Lucerne	
Oxalidaceae	*Oxalis corniculata*	Creeping oxalis	
Passifloraceae	*Passiflora suberosa*	Cork Passionflower	
Phyllanthaceae	*Phyllanthus* sp.	-	
Poaceae	*Cenchrus ciliaris*	Buffel Grass	
	Echinochloa colona	Awnless Barnyard Grass	
	Megathyrsus maximus	Green Panic	Environmental
	Melinis repens	Red Natal Grass	Environmental
	Urochloa mosambicensis	Sabi Grass	
Portulacaceae	*Portulaca pilosa*	Hairy Pigweed	
Rubiaceae	*Richardia brasiliensis*	Mexican Clover	
Sapindaceae	*Cardiospermum grandiflorum*	Balloon Weed	Class 3
Solanaceae	*Physalis angulata*	Wild Gooseberry	
	Solanum nigrum	Blackberry Nightshade	Environmental
Trapaceae	*Trapa* sp.	Floating Water Chestnut	Class 1
Verbanaceae	*Glandularia aristigera*	Mayne's Pest	
	Lantana camara	Lantana	Class 3, WoNs

Appendix 7

Vegetation Community Photo Plates


Plate 1 : Community 1 - *Eucalyptus tereticornis* and *Corymbia tesselaris* Open Forest


Plate 2 : Community 2 – *Eucalyptus populnea* and *Eucalyptus melanophloia* Open Forest


Plate 3 : Community 3a – *Eucalyptus coolabah* Open Forest to Woodland


Plate 4 : Community 3b – *Eucalyptus coolabah* Disturbed Open Forest to Woodland


Plate 5 :Community 3c – *Eucalyptus coolabah* Low Open Forest to Woodland


Plate 6 : Community 4a – *Eucalyptus melanophloia* +/- *Eucalyptus crebra* +/- *Corymbia intermedia* +/- *Corymbia dallachiana* Open Forest


Plate 7 : Community 4b – *Eucalyptus melanophloia* and *Petalostigma pubescens* Low Open Forest


Plate 8 : Community 5a – *Eucalyptus populnea* +/- *Eucalyptus melanophloia* +/- *Eucalyptus cambageana* +/- *Corymbia tesselaris* Open Forest


Plate 9 : Community 5b – *Callitris glaucophylla* Low Open Forest


Plate 10 : Community 6 - Eucalyptus *tereticornis* Palustrine Wetland


Plate 11 : Community 7 – *Eucalyptus cambageana* and *Acacia harpophylla* Open Forest to Woodland


Plate 12 : Community 8a – *Acacia harpophylla* +/- *Eucalyptus populnea* Open Forest to Woodland


Plate 13 : Community 8b –*Acacia harpophylla* Low Open Forest


Plate 14 : Community 8c – *Acacia harpophylla* Disturbed Low Open Forest


Plate 15 : Community 9 – *Acacia harpophylla* Palustrine Wetland


Plate 16 :Community 9b – *Acacia harpophylla* Disturbed Palustrine Wetland


Plate 17 : Community 10 - Pre-cleared disturbed area

Appendix 8

Habitat Data Collected During the Post Summer Survey

Parameters	Habitats								
	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low Open-forest	*A.harpophylla* Woodland	Disturbed *A.harpophylla* Woodland	Ephemeral Wetlands	*A.harpophylla* Palustrine Wetland	Disturbed *A.harpophylla* Palustrine Wetland
Canopy Cover	48.13	49.70	39.77	38.95	33.05	23.10	25.30	22.70	15.
Canopy Height	22	10	19.33	9	14	11	25	13.50	9
Size of trees	30-55cm	20-35cm	25-40cm	15-25cm	20-35cm	10-20cm	>35cm	20-35cm	10-25cm
Shrub cover	0.37	0	11.32	4.65	4	0.20	6.40	6.80	0
Hollow Bearing Trees (ha)	22	6	1.33	2	8	1.33	40	0	0
Grass cover	67.89	80	63.20	80.50	48.50	95	12.40	43.60	30.511
Woody debris (ha)	1624.57	220	541	35	2083.83	262	77	1092.50	342.22
Basking areas (ha)	0	NA	NA	NA	950	150	NA	270	33.33
Leaf Litter cover	29.86	12	35.92	22.7	33.47	23	69	33.4	23.49
Leaf litter depth (cm)	1.2	NA	0.8	NA	1.55	1	NA	1.5	0.855

Appendix 9

Habitat Data Collected During the Post Winter Survey

Site	Habitat Type	Condition	RE	Dominant Tree Species	Canopy Cover %	Disturbance Level	Hollows (5-10 cm)		Ground Cover		Presence/Absence			Patch Size	Connectivity	Proximity To Water (m)
							Abundance	Height	FWD	% Cover	Gilgai	Soil Cracks	Loose Bark			
A1	Riparian	Remnant	11.3.4	*E. tereticornis* *C. tesselaris* *E. cambagiana*	35	0	7	12	25.5	96	N	N	Y	281	High	0
A2	Eucalypt Open-forest	Remnant	11.3.2	*E. populnea*	25	1	3	15	10.5	93	N	N	Y	700	High	60
B1	Eucalypt Open-forest	Remnant	11.5.9	*A. harpophylla* *E. melanophloia* *E.crebra* *C. intermedia*	30	3	3	15	9	59	Y	Y	Y	6	Low	1400
B2	Brigalow Disturbed Palustrine Wetland	HVR	11.4.8a	*A. harpophylla*	75	1	0	n/a	0	66	Y	Y	Y	15	Low	1000
H1	Riparian	Remnant	11.3.3	*E. coolibah* *E. tereticornis*	35	1	7	12	10.5	84	Y	Y	Y	11	High	50
H2	Eucalypt Open-forest	Remnant	11.5.9	*E. tereticornis A. harpophylla*	50	1	1	n/a	47.5	80	Y	Y	Y	28	Medium	600
1	Eucalypt Open-forest	Remnant	11.5.5	*E. populnea* *E.melanophloia*	30	3	5	12	4.5	88	N	N	Y	9	Low	0
2	Eucalypt Open-forest	Remnant	11.5.9	*E.melanophloia E. crebra* *C. intermedia*	50	1	4	4	71.2	93	N	N	Y	28	Medium	100
3	Brigalow Woodland	Remnant	11.3.1	*E. coolibah* *A. harpophylla E. populnea*	30	2	2	5	10	74	Y	Y	Y	12	Medium	150
4	Riparian	Remnant	11.3.3	*E. Coolibah*	25	2	5	10	22	88	Y	Y	Y	64	High	50
5	Disturbed Brigalow Woodland	HVR	11.3.1	*A. harpophylla*	10	3	0	8	3.5	92	Y	Y	Y	16	High	20
6	Disturbed Brigalow Palustrine Wetland	HVR	11.4.8a	*A. harpophylla*	60	3	0	n/a	30.5	66	Y	Y	Y	6	Low	250
7	Riparian	Remnant	11.3.3	*E. Coolibah* *C. tesselaris* *E. tereticornis A. harpophylla*	30	2	3	7	28.5	95	N	N	Y	18	High	20
8	Riparian	Remnant	11.3.4	*E. tereticornis C. tesselaris*	20	1	5	9	51	100	N	N	Y	54*	High	20
9	Riparian	Remnant	11.3.4	*E. tereticornis* *C.tesselaris* *A. leiocarpa*	50	1	4	10	15	91	N	N	N	54*	High	20
10	Disturbed Brigalow Palustrine Wetland	HVR	11.4.8a	*A. harpophylla E. chlorochlada*	40	2	0	n/a	17	25	Y	Y	Y	8	Low	2,200
11	Eucalypt Open-forest	Remnant	11.5.9	*E.melanophloia C. intermedia*	10	3	7	15	18.5	86	N	N	Y	10	Low	200
12	Riparian	Remnant	11.3.4	*E. tereticornis* *C.tesselaris* *E. cambagiana*	45	1	3	10	26	86	N	N	Y	>100	High	20
13	Eucalypt Open-forest	Remnant	11.5.9	*E.melanophloia C. intermedia E. tesselaris*	20	1	5	10	45.75	82	N	N	Y	99	High	400
14	Eucalypt Open-forest	Remnant	11.5.5	*E. populnea,* *C.tesselaris* *C. intermedia*	15	3	7	15	20	97	N	N	Y	2	Low	230
15	Eucalypt Open-forest	Remnant	11.5.9	*E. populnea* *E.melanophloia C. intermedia C. tesselaris*	30	1	1	6	11	91	N	N	N	100	High	400

Site	Habitat Type	Condition	RE	Dominant Tree	Canopy	Disturbance	Hollows (5-10 cm)		Ground Cover		Presence/Absence			Patch	Connectivity	Proximity
16	Eucalypt Open-forest	Remnant	11.3.2	*E. populnea*	35	1	4	15	12	53	N	Y	Y	700	High	60
17	Brigalow Palustrine Wetland	Remnant	11.4.8a	*A. harpophylla E. coolibah*	60	2	0	10	0	50	Y	Y	Y	10	High	70
18	Eucalypt Open-forest	Remnant	11.5.9	*E. cambagiana C. intermedia*	30	1	5	16	0	79	N	N	Y	80	High	200
19	Riparian	Remnant	11.3.4	*E. tereticornis C. tesselaris C. floribunda*	40	1	5	9	16	93	N	N	Y	281	High	0
20	Riparian	Remnant	11.3.4	*E. tereticornis L. sauveolens C. intermedia*	40	1	5	8	26.5	75	N	N	Y	281	High	0

*Patch extends outside of study area and is therefore much larger than the area presented.

Appendix 10

Site Fauna Species List

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats												Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams		Post-Winter	Post-Summer	
Amphibians	Bufonidae	*Rhinella marina*	cane toad*			✓		✓					✓		✓	✓				1000**	110**	1110**
	Hylidae	*Cyclorana alboguttata*	greenstripe frog	C		✓		✓		✓			✓		✓	✓				1	70**	71**
	Hylidae	*Cyclorana brevipes*	superb collared frog	C		✓														0	0	0
	Hylidae	*Cyclorana cultripes*	grassland collared frog	C		✓														0	0	0
	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog	C		✓									✓					0	1	1
	Hylidae	*Cyclorana platycephala*	water holding frog	C		✓														0	0	0
	Hylidae	*Cyclorana* sp.				✓														0	0	0
	Hylidae	*Cyclorana verrucosa*	rough collared frog	NT		✓														0	0	0
	Hylidae	*Litoria caerulea*	common green treefrog	C		✓		✓		✓			✓		✓	✓				3	25	28
	Hylidae	*Litoria fallax*	eastern sedgefrog	C		✓		✓					✓		✓					25**	61**	86**
	Hylidae	*Litoria inermis*	bumpy rocketfrog	C		✓		✓												1	0	1
	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog	C		✓		✓					✓			✓				2	31**	33**
	Hylidae	*Litoria nasuta*	striped rocketfrog	C		✓														0	0	0
	Hylidae	*Litoria peronii*	emerald spotted treefrog	C		✓		✓												4	20**	24**
	Hylidae	*Litoria revelata*	Revealed Frog	NT				✓												0	20**	20**
	Hylidae	*Litoria rothii*	northern laughing treefrog	C		✓														1	0	1
	Hylidae	*Litoria rubella*	ruddy treefrog	C		✓		✓					✓							6	24**	30**
	Hylidae	*Litoria* sp.				✓														0	0	0
	Hylidae	*Litoria wilcoxii*	eastern stony creek frog	C		✓														0	0	0
	Limnodynastidae	*Adelotus brevis*	tusked frog	V		✓														0	0	0
	Limnodynastidae	*Limnodynastes fletcheri*	barking frog	C		✓														0	0	0
	Limnodynastidae	*Limnodynastes peronii*	striped marshfrog	C		✓		✓							✓	✓				0	11	11
	Limnodynastidae	*Limnodynastes salmini*	salmon striped frog	C		✓		✓							✓					0	21	21
	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog	C		✓		✓		✓					✓	✓				0	121	121
	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk	C		✓		✓		✓					✓					0	7	7
	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog	C		✓		✓		✓					✓					2	20	22
	Myobatrachidae	*Crinia deserticola*	chirping froglet	C		✓														0	0	0
	Myobatrachidae	*Crinia parinsignifera*	beeping froglet	C		✓														0	0	0
	Myobatrachidae	*Crinia signifera*	clicking froglet	C		✓														0	0	0
	Myobatrachidae	*Pseudophryne major*	great brown broodfrog	C		✓														0	0	0
	Myobatrachidae	*Pseudophryne raveni*	copper backed broodfrog	C		✓														0	0	0
	Myobatrachidae	*Pseudophryne* sp.				✓														0	0	0
	Myobatrachidae	*Uperoleia laevigata*	eastern gungan	C		✓														0	0	0
	Myobatrachidae	*Uperoleia littlejohni*	Einasleigh gungan	C		✓														0	0	0

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats											Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
	Myobatrachidae	*Uperoleia rugosa*	chubby gungan	C		✓													0	0	0
	Myobatrachidae	*Uperoleia* sp.				✓													0	0	0
	Total Number of Species																		10	14	16

[1]**Status:** E: Endangered, V: Vulnerable, NT: Near Threatened, LC: Least Concern, C: Common
[2]**Sources:** DEHP (2013a), Bird Data (2013),
[3]100km radius of study area post 1980
* Introduced Species
**Estimated Abundance

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats												Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
Avifauna	Acanthizidae	*Acanthiza apicalis*	inland thornbill	C		✓													0	0	0
	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill	C		✓	✓						✓	✓	✓				✓	✓	✓
	Acanthizidae	*Acanthiza lineata*	striated thornbill	C		✓	✓												0	0	0
	Acanthizidae	*Acanthiza nana*	yellow thornbill	C		✓	✓												0	0	0
	Acanthizidae	*Acanthiza pusilla*	brown thornbill	C		✓	✓												0	0	0
	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill	C		✓	✓												0	0	0
	Acanthizidae	*Acanthiza uropygialis*	chestnut-rumped thornbill	C		✓													0	0	0
	Acanthizidae	*Chthonicola sagittata*	speckled warbler	C		✓	✓			✓	✓								0	✓	✓
	Acanthizidae	*Gerygone albogularis*	white-throated gerygone	C		✓	✓	✓	✓	✓	✓		✓		✓	✓	✓		✓	✓	✓
	Acanthizidae	*Gerygone fusca*	western gerygone	C		✓	✓												0	0	0
	Acanthizidae	*Gerygone mouki*	brown gerygone	C		✓													0	0	0
	Acanthizidae	*Gerygone palpebrosa*	fairy gerygone	C		✓	✓												0	0	0
	Acanthizidae	*Gerygone sp.*				✓													0	0	0
	Acanthizidae	*Sericornis citreogularis*	yellow-throated scrubwren	C		✓													0	0	0
	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren	C		✓	✓												0	0	0
	Acanthizidae	*Smicrornis brevirostris*	weebill	C		✓	✓	✓		✓									✓	0	✓
	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk	C		✓	✓			✓									✓	0	✓
	Accipitridae	*Accipiter fasciatus*	brown goshawk	C		✓	✓						✓						0	✓	✓
	Accipitridae	*Accipiter novaehollandiae*	grey goshawk	NT		✓	✓												0	0	0
	Accipitridae	*Aquila audax*	wedge-tailed eagle	C		✓	✓			✓							✓		✓	✓	✓
	Accipitridae	*Aviceda subcristata*	Pacific baza	C		✓	✓												0	0	0
	Accipitridae	*Circus approximans*	swamp harrier	C		✓	✓												0	0	0
	Accipitridae	*Circus assimilis*	spotted harrier	C		✓	✓										✓		✓	✓	✓
	Accipitridae	*Elanus axillaris*	black-shouldered kite	C		✓	✓										✓		✓	✓	✓
	Accipitridae	*Elanus scriptus*	letter-winged kite	C		✓													0	0	0
	Accipitridae	*Erythrotriorchis radiatus*	red goshawk	E	V	✓	✓												0	0	0
	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle	C		✓	✓												0	0	0
	Accipitridae	*Haliastur indus*	brahminy kite	C		✓													0	0	0
	Accipitridae	*Haliastur sphenurus*	whistling kite	C		✓	✓			✓			✓		✓		✓		✓	✓	✓
	Accipitridae	*Hamirostra melanosternon*	black-breasted buzzard	C		✓													0	0	0
	Accipitridae	*Hieraaetus morphnoides*	little eagle	C		✓	✓												0	0	0
	Accipitridae	*Lophoictinia isura*	square-tailed kite	NT		✓	✓												0	0	0
	Accipitridae	*Milvus migrans*	black kite	C		✓	✓						✓				✓		✓	✓	✓
	Accipitridae	*Pandion cristatus*	eastern osprey	C		✓													0	0	0
	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler	C		✓	✓												0	0	0

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats											Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar	C		✓	✓			✓						✓			✓	✓	✓
	Alaudidae	*Mirafra javanica*	Horsfield's bushlark	C		✓	✓												0	0	0
	Alcedinidae	*Ceyx azureus*	azure kingfisher	C		✓	✓												0	0	0
	Anatidae	*Anas castanea*	chestnut teal	C		✓													0	0	0
	Anatidae	*Anas gracilis*	grey teal	C		✓	✓					✓						✓	✓	✓	✓
	Anatidae	*Anas rhynchotis*	Australasian shoveler	C		✓	✓												0	0	0
	Anatidae	*Anas superciliosa*	Pacific black duck	C		✓	✓					✓						✓	✓	0	✓
	Anatidae	*Aythya australis*	hardhead	C		✓	✓					✓						✓	✓	✓	✓
	Anatidae	*Biziura lobata*	musk duck	C		✓	✓												0	0	0
	Anatidae	*Chenonetta jubata*	Australian wood duck	C		✓	✓					✓			✓			✓	✓	✓	✓
	Anatidae	*Cygnus atratus*	black swan	C		✓	✓											✓	✓	✓	✓
	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck	C		✓	✓											✓	✓	✓	✓
	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck	C		✓	✓											✓	0	✓	✓
	Anatidae	*Malacorhynchus membranaceus*	pink-eared duck	C		✓	✓												0	0	0
	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose	NT		✓	✓			✓								✓	0	✓	✓
	Anatidae	*Nettapus pulchellus*	green pygmy-goose	C		✓													0	0	0
	Anatidae	*Oxyura australis*	blue-billed duck	C		✓	✓												0	0	0
	Anatidae	*Stictonetta naevosa*	freckled duck	NT		✓	✓												0	0	0
	Anatidae	*Tadorna radjah*	radjah shelduck	NT		✓													0	0	0
	Anhingidae	*Anhinga novaehollandiae*	Australasian darter	C		✓	✓	✓										✓	✓	✓	✓
	Anseranatidae	*Anseranas semipalmata*	magpie goose	C		✓	✓										✓		0	✓	✓
	Apodidae	*Aerodramus terraereginae*	Australian swiftlet	NT		✓													0	0	0
	Apodidae	*Apus pacificus*	fork-tailed swift	C		✓													0	0	0
	Apodidae	*Hirundapus caudacutus*	white-throated needletail	C		✓	✓												0	0	0
	Ardeidae	*Ardea ibis*	cattle egret	C		✓	✓											✓	✓	✓	✓
	Ardeidae	*Ardea intermedia*	intermediate egret	C		✓	✓	✓										✓	✓	✓	✓
	Ardeidae	*Ardea modesta*	eastern great egret	C		✓	✓											✓	✓	✓	✓
	Ardeidae	*Ardea pacifica*	white-necked heron	C		✓	✓	✓										✓	✓	✓	✓
	Ardeidae	*Egretta garzetta*	little egret	C		✓	✓											✓	✓	✓	✓
	Ardeidae	*Egretta novaehollandiae*	white-faced heron	C		✓	✓											✓	✓	✓	✓
	Ardeidae	*Ixobrychus dubius*	Australian little bittern	C		✓	✓												0	0	0
	Ardeidae	*Ixobrychus flavicollis*	black bittern	C		✓	✓												0	0	0
	Ardeidae	*Nycticorax caledonicus*	Nankeen night-heron	C		✓	✓	✓											0	✓	✓
	Artamidae	*Artamus cinereus*	black-faced woodswallow	C		✓	✓			✓							✓		✓	✓	✓
	Artamidae	*Artamus cyanopterus*	dusky woodswallow	C		✓	✓										✓		✓	0	✓

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	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow	C		✓	✓			✓	✓				✓	✓			✓	✓	✓
	Artamidae	*Artamus minor*	little woodswallow	C		✓	✓												0	0	0
	Artamidae	*Artamus personatus*	masked woodswallow	C		✓	✓												0	0	0
	Artamidae	*Artamus superciliosus*	white-browed woodswallow	C		✓	✓												0	0	0
	Artamidae	*Cracticus nigrogularis*	pied butcherbird	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Artamidae	*Cracticus tibicen*	Australian magpie	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Artamidae	*Cracticus torquatus*	grey butcherbird	C		✓	✓			✓	✓		✓	✓					✓	✓	✓
	Artamidae	*Strepera graculina*	pied currawong	C		✓	✓			✓	✓								0	✓	✓
	Burhinidae	*Burhinus grallarius*	bush stone-curlew	C		✓	✓												0	0	0
	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo	C		✓	✓	✓		✓							✓		✓	✓	✓
	Cacatuidae	*Cacatua sanguinea*	little corella	C		✓	✓	✓									✓		✓	✓	✓
	Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo	C		✓	✓										✓		0	✓	✓
	Cacatuidae	*Calyptorhynchus funereus*	yellow-tailed black-cockatoo	C		✓	✓												0	0	0
	Cacatuidae	*Calyptorhynchus lathami*	glossy black-cockatoo	V		✓													0	0	0
	Cacatuidae	*Eolophus roseicapillus*	galah	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Cacatuidae	*Nymphicus hollandicus*	cockatiel	C		✓	✓						✓		✓		✓		✓	✓	✓
	Campephagidae	*Coracina lineata*	barred cuckoo-shrike	C		✓													0	0	0
	Campephagidae	*Coracina maxima*	ground cuckoo-shrike	C		✓	✓												0	0	0
	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike	C		✓	✓												0	0	0
	Campephagidae	*Coracina schisticeps*	grey-headed cuckoo-shrike	C															0	0	0
	Campephagidae	*Coracina tenuirostris*	cicadabird	C		✓	✓			✓									0	0	0
	Campephagidae	*Lalage leucomela*	varied triller	C		✓	✓	✓		✓									0	✓	✓
	Campephagidae	*Lalage sueurii*	white-winged triller	C		✓	✓										✓		✓	0	0
	Caprimulgidae	*Caprimulgus macrurus*	large-tailed nightjar	C		✓													0	0	0
	Casuariidae	*Dromaius novaehollandiae*	emu	C		✓	✓												0	0	0
	Charadriidae	*Charadrius ruficapillus*	red-capped plover	C		✓													0	0	0
	Charadriidae	*Charadrius veredus*	oriental plover	C		✓													0	0	0
	Charadriidae	*Elseyornis melanops*	black-fronted dotterel	C														✓	✓	0	✓
	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel	C		✓	✓												0	0	0
	Charadriidae	*Pluvialis fulva*	Pacific golden plover	C		✓													0	0	0
	Charadriidae	*Vanellus miles*	masked lapwing	C		✓	✓										✓		✓	✓	✓
	Charadriidae	*Vanellus tricolor*	banded lapwing	C		✓	✓												0	0	0
	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork	NT		✓	✓			✓									✓	✓	✓
	Cisticolidae	*Cisticola exilis*	golden-headed cisticola	C		✓	✓										✓		✓	✓	✓

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	Cisticolidae	*Cisticola juncidis laveryi*	zitting cisticola	C		✓													0	0	0
	Climacteridae	*Climacteris affinis*	white-browed treecreeper	C		✓													0	0	0
	Climacteridae	*Climacteris erythrops*	red-browed treecreeper	NT		✓													0	0	0
	Climacteridae	*Climacteris picumnus*	brown treecreeper	C		✓	✓												0	0	0
	Climacteridae	*Cormobates leucophaea*	white-throated treecreeper	C		✓	✓												0	0	0
	Climacteridae	*Cormobates leucophaea metastasis*	white-throated treecreeper (southern)	C		✓													0	0	0
	Columbidae	*Chalcophaps indica*	emerald dove	C		✓	✓												0	0	0
	Columbidae	*Columba livia*	rock dove*			✓													0	0	0
	Columbidae	*Ducula bicolor*	pied imperial-pigeon	C		✓													0	0	0
	Columbidae	*Geopelia cuneata*	diamond dove	C		✓	✓			✓									✓	✓	✓
	Columbidae	*Geopelia humeralis*	bar-shouldered dove	C		✓	✓	✓	✓	✓	✓		✓		✓				✓	✓	✓
	Columbidae	*Geopelia striata*	peaceful dove	C		✓	✓			✓									✓	✓	✓
	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)	V	V	✓		✓		✓			✓		✓		✓		✓	✓	✓
	Columbidae	*Leucosarcia picata*	wonga pigeon	C		✓	✓												0	0	0
	Columbidae	*Lopholaimus antarcticus*	topknot pigeon	C		✓													0	0	0
	Columbidae	*Macropygia amboinensis*	brown cuckoo-dove	C		✓													0	0	0
	Columbidae	*Ocyphaps lophotes*	crested pigeon	C		✓	✓	✓	✓	✓	✓						✓		✓	✓	✓
	Columbidae	*Phaps chalcoptera*	common bronzewing	C		✓	✓												0	0	0
	Columbidae	*Phaps histrionica*	flock bronzewing	C		✓													0	0	0
	Columbidae	*Ptilinopus regina*	rose-crowned fruit-dove	C		✓													0	0	0
	Columbidae	*Streptopelia chinensis*	spotted dove*			✓											✓		✓	0	0
	Coraciidae	*Eurystomus orientalis*	dollarbird	C		✓	✓										✓		✓	✓	✓
	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough	C		✓	✓			✓			✓						✓	✓	✓
	Corcoracidae	*Struthidea cinerea*	apostlebird	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Corvidae	*Corvus bennetti*	little crow	C		✓													0	0	0
	Corvidae	*Corvus coronoides*	Australian raven	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Corvidae	*Corvus orru*	Torresian crow	C		✓	✓												0	0	0
	Corvidae	*Corvus sp.*				✓													0	0	0
	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo	C		✓	✓						✓		✓				✓	✓	✓
	Cuculidae	*Cacomantis pallidus*	pallid cuckoo	C		✓	✓										✓		0	✓	✓
	Cuculidae	*Cacomantis variolosus*	brush cuckoo	C		✓	✓												0	0	0
	Cuculidae	*Centropus phasianinus*	pheasant coucal	C		✓	✓	✓		✓	✓				✓		✓		✓	✓	✓
	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo	C		✓	✓										✓		✓	0	✓
	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo	C		✓	✓												0	0	0
	Cuculidae	*Chalcites minutillus minutillus*	little bronze-cuckoo	C		✓	✓												0	0	0

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	Cuculidae	*Chalcites minutillus russatus*	Gould's bronze-cuckoo	C		✓													0	0	0
	Cuculidae	*Chalcites osculans*	black-eared cuckoo	C		✓	✓												0	0	0
	Cuculidae	*Cuculus optatus*	oriental cuckoo	C		✓													0	0	0
	Cuculidae	*Eudynamys orientalis*	eastern koel	C		✓	✓	✓											✓	0	✓
	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo	C		✓	✓												✓	0	✓
	Dicruridae	*Dicrurus bracteatus*	spangled drongo	C		✓	✓	✓			✓						✓		✓	✓	✓
	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin	C		✓	✓												0	0	0
	Estrildidae	*Neochmia modesta*	plum-headed finch	C		✓	✓										✓		✓	✓	✓
	Estrildidae	*Neochmia phaeton*	crimson finch	C		✓													0	0	0
	Estrildidae	*Neochmia phaeton phaeton*	crimson finch	C		✓													0	0	0
	Estrildidae	*Neochmia ruficauda*	star finch	C		✓													0	0	0
	Estrildidae	*Neochmia ruficauda ruficauda*	star finch (eastern subspecies)	E	E	✓													0	0	0
	Estrildidae	*Neochmia temporalis*	red-browed finch	C		✓													0	0	0
	Estrildidae	*Poephila cincta cincta*	black-throated finch (white-rumped subspecies)	E	E	✓													0	0	0
	Estrildidae	*Poephila personata*	masked finch	C		✓													0	0	0
	Estrildidae	*Stagonopleura guttata*	diamond firetail	C		✓													0	0	0
	Estrildidae	*Taeniopygia bichenovii*	double-barred finch	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Estrildidae	*Taeniopygia guttata*	zebra finch	C		✓	✓										✓		✓	✓	✓
	Eurostopodidae	*Eurostopodus argus*	spotted nightjar	C		✓													0	0	0
	Eurostopodidae	*Eurostopodus mystacalis*	white-throated nightjar	C		✓	✓												0	0	0
	Falconidae	*Falco berigora*	brown falcon	C		✓	✓			✓			✓				✓		✓	✓	✓
	Falconidae	*Falco cenchroides*	nankeen kestrel	C		✓	✓			✓			✓				✓		✓	✓	✓
	Falconidae	*Falco hypoleucos*	grey falcon	NT		✓	✓												0	0	0
	Falconidae	*Falco longipennis*	Australian hobby	C		✓	✓										✓		✓	✓	✓
	Falconidae	*Falco peregrinus*	peregrine falcon	C		✓	✓												0	0	0
	Falconidae	*Falco sp.*				✓													0	0	0
	Falconidae	*Falco subniger*	black falcon	C		✓	✓	✓		✓									✓	0	✓
	Glareolidae	*Stiltia isabella*	Australian pratincole	C		✓													0	0	0
	Gruidae	*Grus rubicunda*	brolga	C		✓	✓										✓		✓	✓	✓
	Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher	C			✓												0	0	0
	Haematopodidae	*Haematopus longirostris*	Australian Pied Oystercatcher	C			✓												0	0	0
	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra	C		✓	✓	✓		✓			✓				✓		✓	✓	✓
	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra	C		✓	✓	✓		✓			✓	✓	✓				✓	✓	✓
	Halcyonidae	*Todiramphus chloris*	collared kingfisher	C		✓													0	0	0

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	Halcyonidae	*Todiramphus macleayii*	forest kingfisher	C		✓	✓	✓								✓			✓	✓	✓
	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher	C		✓	✓												0	0	0
	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher	C		✓	✓							✓	✓				✓	✓	✓
	Hirundinidae	*Cheramoeca leucosterna*	white-backed swallow	C		✓													0	0	0
	Hirundinidae	*Hirundo neoxena*	welcome swallow	C		✓	✓			✓							✓		0	✓	✓
	Hirundinidae	*Petrochelidon ariel*	fairy martin	C		✓	✓												0	0	0
	Hirundinidae	*Petrochelidon nigricans*	tree martin	C		✓	✓										✓		✓	✓	✓
	Jacanidae	*Irediparra gallinacea*	comb-crested jacana	C		✓	✓											✓	0	✓	✓
	Laridae	*Anous minutus*	black noddy	C		✓													0	0	0
	Laridae	*Chlidonias hybrida*	whiskered tern	C		✓	✓	✓											✓	0	✓
	Laridae	*Chlidonias leucopterus*	white-winged black tern	C		✓													0	0	0
	Laridae	*Chroicocephalus novaehollandiae*	silver gull	C		✓													0	0	0
	Laridae	*Gelochelidon nilotica*	gull-billed tern	C		✓	✓												0	0	0
	Laridae	*Hydroprogne caspia*	Caspian tern	C		✓	✓											✓	✓	0	✓
	Laridae	*Thalasseus bergii*	crested tern	C		✓													0	0	0
	Maluridae	*Malurus cyaneus*	superb fairy-wren	C		✓	✓						✓	✓			✓		✓	✓	✓
	Maluridae	*Malurus lamberti*	variegated fairy-wren	C		✓	✓								✓				0	✓	✓
	Maluridae	*Malurus leucopterus*	white-winged fairy-wren	C		✓													0	0	0
	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Maluridae	*Malurus splendens*	splendid fairy-wren	C		✓													0	0	0
	Maluridae	*Malurus splendens melanotis*	splendid fairy-wren (black-backed subspecies)	C		✓													0	0	0
	Megaluridae	*Cincloramphus cruralis*	brown songlark	C		✓	✓										✓		0	✓	✓
	Megaluridae	*Cincloramphus mathewsi*	rufous songlark	C		✓	✓												0	0	0
	Megaluridae	*Megalurus gramineus*	little grassbird	C		✓	✓												0	0	0
	Megaluridae	*Megalurus timoriensis*	tawny grassbird	C		✓	✓												0	0	0
	Megapodiidae	*Alectura lathami*	Australian brush-turkey	C		✓	✓												0	0	0
	Megapodiidae	*Megapodius reinwardt*	Orange-footed Scrubfowl	C			✓												0	0	0
	Meliphagidae	*Acanthorhynchus tenuirostris*	eastern spinebill	C		✓													0	0	0
	Meliphagidae	*Anthochaera carunculata*	red wattlebird	C		✓													0	0	0
	Meliphagidae	*Anthochaera phrygia*	regent honeyeater	E	E	✓													0	0	0
	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater	C		✓													0	0	0
	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Meliphagidae	*Epthianura albifrons*	white-fronted chat	C		✓													0	0	0
	Meliphagidae	*Epthianura aurifrons*	orange chat	C		✓													0	0	0
	Meliphagidae	*Epthianura tricolor*	crimson chat	C		✓													0	0	0

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	Meliphagidae	*Gavicalis fasciogularis*	mangrove honeyeater	C		✓													0	0	0
	Meliphagidae	*Gavicalis virescens*	singing honeyeater	C		✓													0	0	0
	Meliphagidae	*Grantiella picta*	painted honeyeater	V		✓													0	0	0
	Meliphagidae	*Lichenostomus chrysops*	Yellow-faced Honeyeater	C			✓												0	0	0
	Meliphagidae	*Lichenostomus fuscus*	Fuscous Honeyeater	C			✓												0	0	0
	Meliphagidae	*Lichenostomus leucotis*	White-eared Honeyeater	C			✓												0	0	0
	Meliphagidae	*Lichenostomus melanops*	yellow-tufted honeyeater	C		✓	✓												0	0	0
	Meliphagidae	*Lichenostomus penicillatus*	White-plumed Honeyeater	C			✓												0	0	0
	Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater	C			✓												0	0	0
	Meliphagidae	*Lichmera indistincta*	brown honeyeater	C		✓	✓			✓			✓						✓	✓	✓
	Meliphagidae	*Manorina flavigula*	yellow-throated miner	C		✓	✓			✓							✓		✓	✓	✓
	Meliphagidae	*Manorina melanocephala*	noisy miner	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater	C		✓	✓												0	0	0
	Meliphagidae	*Meliphaga notata*	yellow-spotted honeyeater	C		✓													0	0	0
	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater	C		✓	✓			✓	✓								0	✓	✓
	Meliphagidae	*Melithreptus brevirostris*	brown-headed honeyeater	C		✓													0	0	0
	Meliphagidae	*Melithreptus gularis*	black-chinned honeyeater	NT		✓	✓												0	0	0
	Meliphagidae	*Melithreptus lunatus*	white-naped honeyeater	C		✓	✓			✓	✓								0	✓	✓
	Meliphagidae	*Myzomela obscura*	dusky honeyeater	C		✓													0	0	0
	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater	C		✓	✓												0	0	0
	Meliphagidae	*Nesoptilotis leucotis*	white-eared honeyeater	C		✓													0	0	0
	Meliphagidae	*Philemon buceroides*	helmeted friarbird	C		✓													0	0	0
	Meliphagidae	*Philemon citreogularis*	little friarbird	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓	✓
	Meliphagidae	*Philemon corniculatus*	noisy friarbird	C		✓	✓			✓	✓		✓	✓					✓	✓	✓
	Meliphagidae	*Phylidonyris niger*	white-cheeked honeyeater	C		✓													0	0	0
	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater	C		✓	✓			✓	✓		✓	✓					✓	✓	✓
	Meliphagidae	*Ptilotula fuscus*	fuscous honeyeater	C		✓													0	0	0
	Meliphagidae	*Ptilotula penicillatus*	white-plumed honeyeater	C		✓													0	0	0
	Meliphagidae	*Ptilotula plumulus*	grey-fronted honeyeater	C		✓													0	0	0
	Meliphagidae	*Purnella albifrons*	white-fronted honeyeater	C		✓													0	0	0
	Meliphagidae	*Ramsayornis fasciatus*	bar-breasted honeyeater	C		✓													0	0	0
	Meliphagidae	*Sugomel niger*	black honeyeater	C		✓													0	0	0
	Meropidae	*Merops ornatus*	rainbow bee-eater	C		✓	✓	✓											✓	✓	✓
	Monarchidae	*Carterornis leucotis*	white-eared monarch	C		✓													0	0	0
	Monarchidae	*Grallina cyanoleuca*	magpie-lark	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats											Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
	Monarchidae	*Monarcha melanopsis*	black-faced monarch	C		✓	✓												0	0	0
	Monarchidae	*Myiagra cyanoleuca*	satin flycatcher	C		✓	✓	✓						✓	✓				0	✓	✓
	Monarchidae	*Myiagra inquieta*	restless flycatcher	C		✓	✓								✓				✓	✓	✓
	Monarchidae	*Myiagra rubecula*	leaden flycatcher	C		✓	✓	✓											✓	0	✓
	Monarchidae	*Symposiarchus trivirgatus*	Spectacled Monarch	C			✓												0	0	0
	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit	C		✓	✓										✓		✓	✓	✓
	Motacillidae	*Motacilla flava sensu lato*	yellow wagtail	C		✓													0	0	0
	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird	C		✓	✓						✓						✓	✓	✓
	Nectariniidae	*Nectarinia jugularis*	Olive-backed Sunbird	C			✓												0	0	0
	Neosittidae	*Daphoenositta chrysoptera*	varied sittella	C		✓	✓												0	0	0
	Oriolidae	*Oriolus sagittatus*	olive-backed oriole	C		✓	✓	✓											✓	0	✓
	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird	C		✓	✓	✓											✓	0	✓
	Otididae	*Ardeotis australis*	Australian bustard	C		✓	✓										✓		✓	✓	✓
	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush	C		✓	✓	✓					✓						✓	✓	✓
	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush	C		✓	✓												0	0	0
	Pachycephalidae	*Falcunculus frontatus*	crested shrike-tit	C		✓													0	0	0
	Pachycephalidae	*Oreoica gutturalis*	crested bellbird	C		✓													0	0	0
	Pachycephalidae	*Pachycephala melanura*	mangrove golden whistler	C		✓													0	0	0
	Pachycephalidae	*Pachycephala pectoralis*	golden whistler	C		✓	✓												0	0	0
	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓	✓
	Pardalotidae	*Pardalotus punctatus*	spotted pardalote	C		✓	✓			✓	✓								0	✓	✓
	Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote	C		✓	✓												0	0	0
	Pardalotidae	*Pardalotus striatus*	striated pardalote	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Passeridae	*Passer domesticus*	house sparrow*			✓	✓										✓		✓	✓	✓
	Pedionomidae	*Pedionomus torquatus*	plains-wanderer	V	V	✓													0	0	0
	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican	C		✓	✓	✓											✓	✓	✓
	Petroicidae	*Eopsaltria australis*	eastern yellow robin	C		✓	✓												0	0	0
	Petroicidae	*Melanodryas cucullata*	hooded robin	C		✓													0	0	0
	Petroicidae	*Microeca fascinans*	jacky winter	C		✓	✓			✓									✓	0	✓
	Petroicidae	*Petroica goodenovii*	red-capped robin	C		✓	✓												0	0	0
	Petroicidae	*Petroica rosea*	rose robin	C		✓													0	0	0
	Petroicidae	*Poecilodryas superciliosa*	white-browed robin	C		✓													0	0	0
	Petroicidae	*Tregellasia capito*	pale-yellow robin	C		✓													0	0	0
	Phaethontidae	*Phaethon rubricauda*	red-tailed tropicbird	V		✓													0	0	0
	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant	C		✓	✓											✓	✓	✓	✓

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	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant	C		✓	✓	✓											✓	0	✓
	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant	C		✓	✓											✓	✓	✓	✓
	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant	C		✓	✓	✓											✓	✓	✓
	Phasianidae	*Coturnix pectoralis*	stubble quail	C		✓	✓												0	0	0
	Phasianidae	*Coturnix ypsilophora*	brown quail	C		✓	✓			✓									✓	0	✓
	Phasianidae	*Excalfactoria chinensis*	king quail	C		✓													0	0	0
	Phasianidae	*Pavo cristatus*	Indian peafowl*			✓	✓												0	0	0
	Pittidae	*Pitta versicolor*	noisy pitta	C		✓													0	0	0
	Podargidae	*Podargus ocellatus plumiferus*	plumed frogmouth	V		✓													0	0	0
	Podargidae	*Podargus strigoides*	tawny frogmouth	C		✓	✓	✓											✓	✓	✓
	Podicipedidae	*Podiceps cristatus*	great crested grebe	C		✓	✓												0	0	0
	Podicipedidae	*Poliocephalus poliocephalus*	hoary-headed grebe	C		✓	✓												0	0	0
	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe	C		✓	✓	✓										✓	✓	✓	✓
	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler	C		✓	✓			✓	✓		✓	✓	✓	✓			✓	✓	✓
	Procellariidae	*Ardenna bulleri*	Buller's shearwater	C		✓													0	0	0
	Procellariidae	*Macronectes giganteus*	southern giant-petrel	E	E	✓													0	0	0
	Psittacidae	*Alisterus scapularis*	Australian king-parrot	C		✓	✓												0	0	0
	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Psittacidae	*Glossopsitta concinna*	musk lorikeet	C		✓													0	0	0
	Psittacidae	*Glossopsitta pusilla*	little lorikeet	C		✓	✓	✓		✓	✓		✓						✓	0	✓
	Psittacidae	*Lathamus discolor*	swift parrot	E	E	✓													0	0	0
	Psittacidae	*Melopsittacus undulatus*	budgerigar	C		✓	✓			✓			✓		✓				✓	✓	✓
	Psittacidae	*Neophema pulchella*	turquoise parrot	NT		✓													0	0	0
	Psittacidae	*Northiella haematogaster*	blue bonnet	C		✓													0	0	0
	Psittacidae	*Platycercus adscitus*	pale-headed rosella	C		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Psittacidae	*Platycercus elegans*	crimson rosella	C		✓													0	0	0
	Psittacidae	*Platycercus eximius*	eastern rosella	C		✓													0	0	0
	Psittacidae	*Psephotus haematonotus*	red-rumped parrot	C		✓													0	0	0
	Psittacidae	*Psephotus pulcherrimus*	paradise parrot	PE	EX	✓													0	0	0
	Psittacidae	*Psephotus varius*	mulga parrot	C		✓													0	0	0
	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet	C		✓	✓	✓	✓	✓	✓						✓		✓	✓	✓
	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet	C		✓	✓	✓	✓	✓	✓						✓		✓	✓	✓
	Psophodidae	*Cinclosoma castaneothorax*	chestnut-breasted quail-thrush	C		✓													0	0	0
	Psophodidae	*Cinclosoma punctatum*	spotted quail-thrush	C		✓													0	0	0
	Psophodidae	*Psophodes cristatus*	chirruping wedgebill	C		✓													0	0	0

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	Psophodidae	*Psophodes olivaceus*	eastern whipbird	C		✓	✓												0	0	0
	Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird	C		✓	✓										✓		✓	0	✓
	Ptilonorhynchidae	*Ptilonorhynchus violaceus*	satin bowerbird	C		✓													0	0	0
	Ptilonorhynchidae	*Sericulus chrysocephalus*	regent bowerbird	C		✓													0	0	0
	Rallidae	*Amaurornis moluccana*	pale-vented bush-hen	C		✓													0	0	0
	Rallidae	*Fulica atra*	Eurasian coot	C		✓	✓											✓	✓	✓	✓
	Rallidae	*Gallinula tenebrosa*	dusky moorhen	C		✓	✓											✓	✓	✓	✓
	Rallidae	*Gallirallus philippensis*	buff-banded rail	C		✓	✓												0	0	0
	Rallidae	*Lewinia pectoralis*	Lewin's rail	NT		✓													0	0	0
	Rallidae	*Porphyrio porphyrio*	purple swamphen	C		✓	✓	✓										✓	0	✓	✓
	Rallidae	*Porzana fluminea*	Australian spotted crake	C		✓													0	0	0
	Rallidae	*Porzana pusilla*	Baillon's crake	C		✓													0	0	0
	Rallidae	*Tribonyx ventralis*	black-tailed native-hen	C		✓													0	0	0
	Recurvirostridae	*Himantopus himantopus*	black-winged stilt	C		✓	✓											✓	✓	✓	✓
	Recurvirostridae	*Recurvirostra novaehollandiae*	red-necked avocet	C		✓	✓												0	0	0
	Rhipiduridae	*Rhipidura albiscapa*	grey fantail	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Rhipiduridae	*Rhipidura rufifrons*	rufous fantail	C		✓	✓												0	0	0
	Rostratulidae	*Rostratula australis*	Australian painted snipe	V	E	✓													0	0	0
	Scolopacidae	*Arenaria interpres*	ruddy turnstone	C		✓													0	0	0
	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper	C		✓													0	0	0
	Scolopacidae	*Calidris ferruginea*	curlew sandpiper	C		✓													0	0	0
	Scolopacidae	*Calidris ruficollis*	red-necked stint	C		✓													0	0	0
	Scolopacidae	*Gallinago hardwickii*	Latham's snipe	C		✓	✓												0	0	0
	Scolopacidae	*Limosa lapponica*	bar-tailed godwit	C		✓													0	0	0
	Scolopacidae	*Limosa limosa*	black-tailed godwit	C		✓													0	0	0
	Scolopacidae	*Numenius minutus*	little curlew	C		✓													0	0	0
	Scolopacidae	*Tringa glareola*	wood sandpiper	C		✓	✓												0	0	0
	Scolopacidae	*Tringa nebularia*	common greenshank	C		✓													0	0	0
	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper	C		✓	✓												0	0	0
	Stercorariidae	*Stercorarius pomarinus*	pomarine jaeger	C		✓													0	0	0
	Strigidae	*Ninox connivens*	barking owl	C		✓	✓												0	0	0
	Strigidae	*Ninox novaeseelandiae*	Southern Boobook	C			✓									✓			✓	✓	✓
	Strigidae	*Ninox strenua*	powerful owl	V		✓													0	0	0
	Sturnidae	*Sturnus tristis*	Common Myna*				✓												0	0	0

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	Sturnidae	*Sturnus vulgaris*	common starling*			✓	✓										✓		0	✓	✓
	Sulidae	*Sula leucogaster*	brown booby	C		✓													0	0	0
	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill	C		✓	✓	✓				✓							✓	✓	✓
	Threskiornithidae	*Platalea regia*	royal spoonbill	C		✓	✓					✓						✓	✓	0	✓
	Threskiornithidae	*Plegadis falcinellus*	glossy ibis	C		✓						✓							✓	0	✓
	Threskiornithidae	*Threskiornis molucca*	Australian white ibis	C		✓	✓					✓						✓	✓	✓	✓
	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis	C		✓	✓					✓						✓	✓	✓	✓
	Timaliidae	*Zosterops lateralis*	silvereye	C		✓	✓												0	0	0
	Turdidae	*Zoothera heinei*	russet-tailed thrush	C		✓													0	0	0
	Turnicidae	*Turnix maculosus*	red-backed button-quail	C		✓													0	0	0
	Turnicidae	*Turnix melanogaster*	black-breasted button-quail	V	V	✓													0	0	0
	Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail	C		✓	✓												0	0	0
	Turnicidae	*Turnix varius*	painted button-quail	C		✓													0	0	0
	Turnicidae	*Turnix velox*	little button-quail	C		✓													0	0	0
	Tytonidae	*Tyto javanica*	eastern barn owl	C		✓	✓			✓							✓		✓	✓	✓
	Tytonidae	*Tyto longimembris*	eastern grass owl	C		✓													0	0	0
	Tytonidae	*Tyto novaehollandiae*	masked owl	C		✓													0	0	0
	Tytonidae	*Tyto tenebricosa tenebricosa*	sooty owl	NT		✓													0	0	0
	Total Number of Species																		121	118	139

[1]**Status:** E: Endangered, V: Vulnerable, NT: Near Threatened, LC: Least Concern, C: Common
[2]**Sources:** DEHP (2013a), Bird Data (2013),
[3]100km radius of study area post 1980
* Introduced Species
**Estimated Abundance
Note: No accurate abundance data was collected for avifauna

Taxa	Family	Scientific Name	Common Name[5]	Legislation Status[1]		Database Records[2,3]		Habitats[4]											Seasonal Counts[5]		Survey Total[5]
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Mammals	Acrobatidae	*Acrobates pygmaeus*	feathertail glider	C		✓													0	0	0
	Bovidae	*Bos sp.*	cattle*			✓		✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
	Bovidae	*Capra hircus*	goat*			✓													0	0	0
	Canidae	*Canis lupus dingo*	dingo			✓													0	0	0
	Canidae	*Canis lupus familiaris*	dog *			✓											✓		✓***	0	✓
	Canidae	*Canis sp.*				✓													0	0	0
	Canidae	*Vulpes vulpes*	red fox*			✓		✓											0	1	1
	Dasyuridae	*Antechinus flavipes flavipes*	yellow-footed antechinus (south-east Queensland)	C		✓													0	0	0
	Dasyuridae	*Antechinus sp.*				✓													0	0	0
	Dasyuridae	*Dasyurus geoffroii geoffroii*	western quoll	PE	V	✓													0	0	0
	Dasyuridae	*Dasyurus hallucatus*	northern quoll	C	E	✓													0	0	0
	Dasyuridae	*Dasyurus sp.*				✓													0	0	0
	Dasyuridae	*Phascogale tapoatafa*	brush-tailed phascogale	C		✓													0	0	0
	Dasyuridae	*Planigale ingrami*	long-tailed planigale	C		✓													0	0	0
	Dasyuridae	*Planigale maculata*	common planigale	C		✓													0	0	0
	Dasyuridae	*Planigale tenuirostris*	narrow-nosed planigale	C		✓													0	0	0
	Dasyuridae	*Sminthopsis macroura*	stripe-faced dunnart	C		✓													0	0	0
	Dasyuridae	*Sminthopsis murina*	common dunnart	C		✓													0	0	0
	Dasyuridae	*Sminthopsis sp.*				✓													0	0	0
	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat	C		✓		✓		✓		✓	✓	✓	✓	✓			✓	✓	✓
	Emballonuridae	*Taphozous georgianus*	Common Sheath-tailed Bat	C		✓													0	0	0
	Emballonuridae	*Taphozous troughtoni*	Troughton's sheathtail bat	C		✓													0	0	0
	Equidae	*Equus caballus*	horse*			✓													0	0	0
	Felidae	*Felis catus*	cat*			✓				✓									1	1	2
	Hipposideridae	*Hipposideros ater aruensis*	eastern dusky leaf-nosed bat	C		✓													0	0	0
	Leporidae	*Lepus europaeus*	European brown hare*			✓											✓		10**	1	11
	Leporidae	*Oryctolagus cuniculus*	rabbit*			✓										✓	✓		10**	1	11
	Macropodidae	*Lagorchestes conspicillatus*	spectacled hare-wallaby	C		✓													0	0	0
	Macropodidae	*Macropus agilis*	agile wallaby	C		✓													0	0	0
	Macropodidae	*Macropus dorsalis*	black-striped wallaby	C		✓													0	0	0
	Macropodidae	*Macropus giganteus*	eastern grey kangaroo	C		✓		✓									✓		30**	30**	60**
	Macropodidae	*Macropus parryi*	whiptail wallaby	C		✓													0	0	0
	Macropodidae	*Macropus robustus*	common wallaroo	C		✓													0	0	0
	Macropodidae	*Macropus rufogriseus*	red-necked wallaby	C		✓													0	0	0
	Macropodidae	*Macropus rufus*	red kangaroo	C		✓													0	0	0

Taxa	Family	Scientific Name	Common Name[5]	Legislation Status[1]		Database Records[2,3]		Habitats[4]											Seasonal Counts[5]		Survey Total[5]
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
	Macropodidae	*Macropus sp.*				✓													0	0	0
	Macropodidae	*Onychogalea fraenata*	bridled nailtail wallaby	E	E	✓													0	0	0
	Macropodidae	*Petrogale herberti*	Herbert's rock-wallaby	C		✓													0	0	0
	Macropodidae	*Petrogale inornata*	unadorned rock-wallaby	C		✓													0	0	0
	Macropodidae	*Petrogale sp.*		C		✓													0	0	0
	Macropodidae	*Wallabia bicolor*	swamp wallaby	C		✓											✓		1	0	1
	Megadermatidae	*Macroderma gigas*	ghost bat	V		✓													0	0	0
	Molossidae	*Chaerephon jobensis*	northern freetail bat	C		✓		✓		✓		✓	✓		✓	✓			0	✓	✓
	Molossidae	*Mormopterus beccarii*	Beccari's freetail bat	C		✓		✓		✓		✓				✓			✓	✓	✓
	Molossidae	*Mormopterus eleryi*	bristle-faced free-tailed bat	C		✓													0	0	0
	Molossidae	*Mormopterus loriae ridei*	little north-eastern freetail bat	C		✓													0	0	0
	Molossidae	*Mormopterus planiceps*	southern freetail bat	C		✓													0	0	0
	Molossidae	*Mormopterus sp.*				✓						✓							✓	✓	✓
	Molossidae	*Tadarida australis*	white-striped freetail bat	C		✓													0	0	0
	Muridae	*Hydromys chrysogaster*	water rat	C		✓		✓											1***	0	1
	Muridae	*Leggadina forresti*	Forrest's mouse	C		✓													0	0	0
	Muridae	*Melomys burtoni*	grassland melomys	C		✓													0	0	0
	Muridae	*Melomys cervinipes*	fawn-footed melomys	C		✓													0	0	0
	Muridae	*Melomys sp.*				✓													0	0	0
	Muridae	*Mus musculus*	house mouse*			✓		✓		✓									3	0	3
	Muridae	*Pseudomys delicatulus*	delicate mouse	C		✓													0	0	0
	Muridae	*Pseudomys desertor*	desert mouse	C		✓													0	0	0
	Muridae	*Pseudomys gracilicaudatus*	eastern chestnut mouse	C		✓													0	0	0
	Muridae	*Pseudomys patrius*	eastern pebble-mound mouse	C		✓													0	0	0
	Muridae	*Pseudomys sp.*				✓													0	0	0
	Muridae	*Rattus fuscipes*	bush rat	C		✓													0	0	0
	Muridae	*Rattus lutreolus*	swamp rat	C		✓													0	0	0
	Muridae	*Rattus rattus*	black rat*			✓													0	0	0
	Muridae	*Rattus sordidus*	canefield rat	C		✓													0	0	0
	Muridae	*Rattus sp.*				✓													0	0	0
	Muridae	*Rattus sp. cf. villosissimus/sordidus*		C		✓													0	0	0
	Muridae	*Rattus tunneyi*	pale field-rat	C		✓													0	0	0
	Muridae	*Zyzomys argurus*	common rock-rat	C		✓													0	0	0
	Ornithorhynchidae	*Ornithorhynchus anatinus*	platypus	C, SPL		✓													0	0	0

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	Peramelidae	*Isoodon macrourus*	northern brown bandicoot	C		✓													0	0	0
	Peramelidae	*Isoodon sp.*				✓													0	0	0
	Peramelidae	*Perameles nasuta*	long-nosed bandicoot	C		✓													0	0	0
	Petauridae	*Petaurus australis australis*	yellow-bellied glider (southern subspecies)	C		✓													0	0	0
	Petauridae	*Petaurus breviceps*	sugar glider	C		✓													0	0	0
	Petauridae	*Petaurus norfolcensis*	squirrel glider	C		✓													0	0	0
	Petauridae	*Petaurus sp.*				✓													0	0	0
	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum	C		✓		✓					✓						25**	5	30
	Phascolarctidae	*Phascolarctos cinereus*	koala	V, SPL	V	✓													0	0	0
	Potoroidae	*Aepyprymnus rufescens*	rufous bettong	C		✓		✓						✓					3	3	6
	Potoroidae	*Bettongia tropica*	northern bettong	E	E	✓													0	0	0
	Pseudocheiridae	*Petauroides volans*	greater glider	C		✓		✓											5	2	7
	Pseudocheiridae	*Pseudocheirus peregrinus*	common ringtail possum	C		✓													0	0	0
	Pteropodidae	*Pteropus alecto*	black flying-fox	C		✓		✓											1	0	1
	Pteropodidae	*Pteropus scapulatus*	little red flying-fox	C		✓											✓		1	0	1
	Pteropodidae	*Pteropus sp.*				✓													0	0	0
	Rhinolophidae	*Rhinolophus megaphyllus*	eastern horseshoe-bat	C		✓													0	0	0
	Suidae	*Sus scrofa*	pig*			✓		✓								✓			2	5	7
	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna	C, SPL		✓					✓						✓		2	0	2
	Vespertilionidae	*Chalinolobus dwyeri*	large-eared pied bat	V	V	✓													0	0	0
	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat	C		✓		✓		✓		✓	✓		✓	✓			✓	✓	✓
	Vespertilionidae	*Chalinolobus morio*	chocolate wattled bat	C		✓		✓		✓					✓				✓	✓	✓
	Vespertilionidae	*Chalinolobus nigrogriseus*	hoary wattled bat	C		✓													0	0	0
	Vespertilionidae	*Chalinolobus picatus*	little pied bat	NT		✓		✓		✓		✓	✓		✓	✓			✓	✓	✓
	Vespertilionidae	*Kerivoula papuensis*	golden-tipped bat	NT		✓													0	0	0
	Vespertilionidae	*Miniopterus australis*	little bent-wing bat	C		✓		✓		✓			✓						0	✓	✓
	Vespertilionidae	*Miniopterus schreibersii*	eastern bent-wing bat	C		✓		✓		✓			✓		✓	✓			✓	✓	✓
	Vespertilionidae	*Myotis macropus*	large-footed myotis	C		✓													0	0	0
	Vespertilionidae	*Nyctophilus bifax*	eastern long-eared bat	C				✓											1	0	1
	Vespertilionidae	*Nyctophilus corbeni*	eastern long-eared bat	V	V	✓													0	0	0
	Vespertilionidae	*Nyctophilus geoffroyi*	lesser long-eared bat	C		✓		✓											2	0	2
	Vespertilionidae	*Nyctophilus gouldi*	Gould's long-eared bat	C		✓		✓											1	0	1
	Vespertilionidae	*Nyctophilus sp.*				✓		✓		✓		✓			✓	✓			✓	✓	✓
	Vespertilionidae	*Scotorepens balstoni*	inland broad-nosed bat	C		✓		✓		✓		✓	✓	✓	✓	✓			✓	✓	✓

Taxa	Family	Scientific Name	Common Name[5]	Legislation Status[1]		Database Records[2,3]		Habitats[4]											Seasonal Counts[5]		Survey Total[5]
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	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat	C		✓		✓		✓		✓	✓	✓	✓	✓			✓	✓	✓
	Vespertilionidae	*Scotorepens orion*	south-eastern broad-nosed bat	C		✓													0	0	0
	Vespertilionidae	*Scotorepens sanborni*	northern broad-nosed bat	C		✓													0	0	0
	Vespertilionidae	*Scotorepens sp.*				✓													0	0	0
	Vespertilionidae	*Scotorepens sp. (Parnaby)*	central-eastern broad-nosed bat	C		✓													0	0	0
	Vespertilionidae	*Vespadelus baverstocki*	inland forest bat	C		✓													0	0	0
	Vespertilionidae	*Vespadelus pumilus*	eastern forest bat	C		✓													0	0	0
	Vespertilionidae	*Vespadelus sp.*				✓													0	0	0
	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat	C		✓													0	0	0
	Vespertilionidae	*Vespadelus vulturnus*	little forest bat	C		✓													0	0	0
	Vombatidae	*Lasiorhinus krefftii*	northern hairy-nosed wombat	E	E	✓													0	0	0
	Total Number of Species																		111**	62**	173**

[1]**Status:** E: Endangered, V: Vulnerable, NT: Near Threatened, LC: Least Concern, SPL: Special Least Concern, C: Common
[2]**Sources:** DEHP (2013a), Bird Data (2013),
[3]100km radius of study area post 1980
*Introduced Species
**Estimated Abundance
***Species identified indirectly due to presence of tracks, bones, scats etc.
Note: ✓ were used in abundance counts were abundance data was not collected

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats											Seasonal Counts		Survey Total
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Reptiles	Agamidae	*Amphibolurus burnsi*	Burns' Dragon	C		✓				✓					✓				1	1	2
	Agamidae	*Amphibolurus gilberti*	Gilbert's dragon	C		✓													0	0	0
	Agamidae	*Amphibolurus muricatus*	jacky lizard	C		✓													0	0	0
	Agamidae	*Chlamydosaurus kingii*	frilled lizard	C		✓													0	0	0
	Agamidae	*Ctenophorus pictus*	painted dragon	C		✓													0	0	0
	Agamidae	*Diporiphora australis*		C		✓													0	0	0
	Agamidae	*Diporiphora lalliae*		C		✓													0	0	0
	Agamidae	*Diporiphora nobbi*	Nobbi Dragon	C		✓									✓				0	1	1
	Agamidae	*Diporiphora phaeospinosa*		C		✓													0	0	0
	Agamidae	*Diporiphora sp.*				✓													0	0	0
	Agamidae	*Intellagama lesueurii*	eastern water dragon	C		✓													0	0	0
	Agamidae	*Pogona barbata*	bearded dragon	C		✓													0	0	0
	Agamidae	*Pogona sp.*				✓													0	0	0
	Agamidae	*Pogona vitticeps*		C		✓													0	0	0
	Agamidae	*Tympanocryptis lineata*	lined earless dragon	C		✓													0	0	0
	Boidae	*Antaresia maculosa*	spotted python	C		✓		✓											0	0	0
	Boidae	*Antaresia stimsoni*	Stimson's python	C		✓													0	0	0
	Boidae	*Aspidites melanocephalus*	black-headed python	C		✓													0	0	0
	Boidae	*Morelia spilota*	carpet python	C		✓		✓											0	0	0
	Carphodactylidae	*Nephrurus asper*	spiny knob-tailed gecko	C		✓													0	0	0
	Carphodactylidae	*Nephrurus levis*		C		✓													0	0	0
	Carphodactylidae	*Saltuarius salebrosus*	rough-throated leaf-tailed gecko	C		✓													0	0	0
	Carphodactylidae	*Underwoodisaurus milii*		C		✓													0	0	0
	Chelidae	*Chelodina expansa*	broad-shelled river turtle	C		✓													0	0	0
	Chelidae	*Chelodina longicollis*	eastern snake-necked turtle	C		✓													0	0	0
	Chelidae	*Elseya albagula*	southern snapping turtle	C		✓													0	0	0
	Chelidae	*Elseya sp.*				✓													0	0	0
	Chelidae	*Emydura macquarii krefftii*	Krefft's river turtle	C		✓													0	0	0
	Chelidae	*Emydura macquarii macquarii*	Murray turtle	C		✓													0	0	0
	Chelidae	*Rheodytes leukops*	Fitzroy River turtle	V	V	✓													0	0	0
	Chelidae	*Wollumbinia latisternum*	saw-shelled turtle	C		✓													0	0	0
	Colubridae	*Boiga irregularis*	brown tree snake	C		✓											✓		0	0	0
	Colubridae	*Dendrelaphis punctulata*	common tree snake	C		✓							✓		✓				0	2	2
	Colubridae	*Tropidonophis mairii*	freshwater snake	C		✓		✓											0	2	2
	Diplodactylidae	*Amolosia lesueurii*	Lesueur's velvet gecko	C		✓													0	0	0

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	Diplodactylidae	*Amolosia rhombifer*	zig-zag gecko	C		✓													0	0	0
	Diplodactylidae	*Diplodactylus conspicillatus*	fat-tailed diplodactylus	C		✓													0	0	0
	Diplodactylidae	*Diplodactylus vittatus*	wood gecko	C		✓													0	0	0
	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko	C		✓													0	0	0
	Diplodactylidae	*Nebulifera robusta*	robust velvet gecko	C		✓													0	0	0
	Diplodactylidae	*Oedura marmorata*	marbled velvet gecko	C		✓				✓									1	0	1
	Diplodactylidae	*Oedura monilis*		C		✓				✓									0	1	1
	Diplodactylidae	*Oedura sp.*				✓													0	0	0
	Diplodactylidae	*Oedura tryoni*	southern spotted velvet gecko	C		✓													0	0	0
	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko	NT		✓													0	0	0
	Diplodactylidae	*Strophurus williamsi*	soft-spined gecko	C		✓													0	0	0
	Elapidae	*Acanthophis antarcticus*	common death adder	NT		✓													0	0	0
	Elapidae	*Brachyurophis australis*	coral snake	C		✓													0	0	0
	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake	C		✓									✓				0	1	1
	Elapidae	*Cryptophis nigrescens*	eastern small-eyed snake	C		✓													0	0	0
	Elapidae	*Cryptophis nigrostriatus*	black-striped snake	C		✓													0	0	0
	Elapidae	*Demansia psammophis*	yellow-faced whip snake	C		✓				✓						✓			1	2	3
	Elapidae	*Demansia torquata*	collared whip snake	C		✓													0	0	0
	Elapidae	*Demansia vestigiata*	black whip snake	C		✓													0	0	0
	Elapidae	*Denisonia maculata*	ornamental snake	V	V	✓		✓							✓				0	3	3
	Elapidae	*Furina barnardi*	yellow-naped snake	NT		✓													0	0	0
	Elapidae	*Furina diadema*	red-naped snake	C		✓		✓											1	0	1
	Elapidae	*Furina ornata*	orange-naped snake	C		✓													0	0	0
	Elapidae	*Hemiaspis damelii*	grey snake	E		✓													0	0	0
	Elapidae	*Hoplocephalus bitorquatus*	pale-headed snake	C		✓													0	0	0
	Elapidae	*Notechis scutatus*	eastern tiger snake	C		✓													0	0	0
	Elapidae	*Parasuta dwyeri*	Dwyer's snake	C		✓													0	0	0
	Elapidae	*Pseudechis australis*	king brown snake	C		✓													0	0	0
	Elapidae	*Pseudechis guttatus*	spotted black snake	C		✓													0	0	0
	Elapidae	*Pseudechis porphyriacus*	red-bellied black snake	C		✓													0	0	0
	Elapidae	*Pseudonaja nuchalis sensu lato*	western brown snake	C		✓										✓			1	0	1
	Elapidae	*Pseudonaja textilis*	eastern brown snake	C		✓		✓									✓		1	0	1
	Elapidae	*Suta suta*	myall snake	C		✓													0	0	0
	Elapidae	*Tropidechis carinatus*	Rough-scaled Snake	C		✓									✓				0	1	1
	Elapidae	*Vermicella annulata*	bandy-bandy	C		✓													0	0	0

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	Gekkonidae	*Gehyra catenata*		C		✓		✓		✓		✓	✓			✓			3	4	7
	Gekkonidae	*Gehyra dubia*		C		✓		✓							✓				1	1	2
	Gekkonidae	*Gehyra sp.*		C		✓		✓					✓			✓			0	4	4
	Gekkonidae	*Gehyra variegata*	tree dtella	C		✓													0	0	0
	Gekkonidae	*Hemidactylus frenatus*	house gecko*			✓													0	0	0
	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko	C		✓		✓					✓		✓	✓			20**	35	55
	Gekkonidae	*Oedura monilis*				✓				✓									0	1	1
	Pygopodidae	*Delma tincta*		C		✓													0	0	0
	Pygopodidae	*Delma torquata*	collared delma	V	V	✓													0	0	0
	Pygopodidae	*Lialis burtonis*	Burton's legless lizard	C		✓													0	0	0
	Pygopodidae	*Paradelma orientalis*	brigalow scaly-foot	V		✓													0	0	0
	Pygopodidae	*Pygopus lepidopodus*	common scaly-foot	C		✓													0	0	0
	Pygopodidae	*Pygopus schraderi*	eastern hooded scaly-foot	C		✓													0	0	0
	Scincidae	*Anomalopus brevicollis*		C		✓													0	0	0
	Scincidae	*Anomalopus leuckartii*		C		✓													0	0	0
	Scincidae	*Anomalopus verreauxii*		C		✓													0	0	0
	Scincidae	*Bellatorias frerei*	major skink	C		✓													0	0	0
	Scincidae	*Carlia munda*		C		✓													0	0	0
	Scincidae	*Carlia pectoralis*	open-litter rainbow skink	C		✓		✓					✓						3	0	3
	Scincidae	*Carlia pectoralis sensu lato*		C		✓													0	0	0
	Scincidae	*Carlia schmeltzii*		C		✓		✓					✓		✓				1	4	5
	Scincidae	*Carlia sp.*				✓				✓			✓		✓				0	6	6
	Scincidae	*Carlia vivax*		C		✓		✓		✓			✓		✓	✓			1	16	17
	Scincidae	*Cryptoblepharus metallicus*	metallic snake-eyed skink	C		✓													0	0	0
	Scincidae	*Cryptoblepharus pannosus*	ragged snake-eyed skink	C		✓													0	0	0
	Scincidae	*Cryptoblepharus plagiocephalus sensu lato*		C		✓													0	0	0
	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink	C		✓													0	0	0
	Scincidae	*Cryptoblepharus sp.*				✓													0	0	0
	Scincidae	*Cryptoblepharus virgatus*	striped snake-eyed skink	C		✓		✓		✓			✓		✓	✓			3	22	25
	Scincidae	*Ctenotus allotropis*		C		✓													0	0	0
	Scincidae	*Ctenotus ingrami*		C		✓													0	0	0
	Scincidae	*Ctenotus leonhardii*		C		✓													0	0	0
	Scincidae	*Ctenotus robustus*		C		✓													0	0	0
	Scincidae	*Ctenotus sp.*				✓													0	0	0
	Scincidae	*Ctenotus strauchii*		C		✓													0	0	0

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats											Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
	Scincidae	*Ctenotus taeniolatus*	copper-tailed skink	C		✓													0	0	0
	Scincidae	*Cyclodomorphus gerrardii*	pink-tongued lizard	C		✓													0	0	0
	Scincidae	*Egernia rugosa*	yakka skink	V	V	✓													0	0	0
	Scincidae	*Egernia striolata*	tree skink	C		✓													0	0	0
	Scincidae	*Eremiascincus fasciolatus*	narrow-banded sand swimmer	C		✓													0	0	0
	Scincidae	*Eremiascincus richardsonii*	broad-banded sand swimmer	C		✓													0	0	0
	Scincidae	*Eulamprus brachysoma*		C		✓													0	0	0
	Scincidae	*Eulamprus martini*		C		✓													0	0	0
	Scincidae	*Eulamprus quoyii*	eastern water skink	C		✓													0	0	0
	Scincidae	*Eulamprus sokosoma*		C		✓													0	0	0
	Scincidae	*Eulamprus sp.*				✓													0	0	0
	Scincidae	*Eulamprus tenuis*		C		✓													0	0	0
	Scincidae	*Glaphyromorphus punctulatus*		C		✓													0	0	0
	Scincidae	*Lampropholis adonis*		C		✓													0	0	0
	Scincidae	*Lampropholis amicula*		C		✓													0	0	0
	Scincidae	*Lampropholis delicata*		C		✓													0	0	0
	Scincidae	*Lampropholis sp.*		C		✓													0	0	0
	Scincidae	*Lerista allanae*	Allan's lerista	E	E	✓													0	0	0
	Scincidae	*Lerista fragilis*		C		✓													0	0	0
	Scincidae	*Lerista punctatovittata*		C		✓										✓			0	0	0
	Scincidae	*Lerista sp.*				✓													0	0	0
	Scincidae	*Lygisaurus foliorum*		C		✓		✓	✓						✓	✓			11	1	12
	Scincidae	*Menetia greyii*		C		✓				✓									0	1	1
	Scincidae	*Menetia sp.*				✓													0	0	0
	Scincidae	*Menetia timlowi*		C		✓													0	0	0
	Scincidae	*Morethia boulengeri*		C		✓					✓								1	0	1
	Scincidae	*Morethia taeniopleura*	fire-tailed skink	C		✓									✓	✓			0	2	2
	Scincidae	*Tiliqua rugosa aspera*	shingle-back (eastern subspecies)	C		✓													0	0	0
	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard	C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops affinis*		C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops bituberculatus*		C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops grypus*		C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops ligatus*		C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops nigrescens*		C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops proximus*		C		✓													0	0	0

Taxa	Family	Scientific Name	Common Name	Legislation Status[1]		Database Records[2,3]		Habitats											Seasonal Counts		Survey Total
				NCA	EPBC	Wildlife Online	Bird Data	Riparian Woodland	Disturbed Riparian Woodland	Eucalypt Open-forest	Disturbed Eucalypt Low-open Forest	Ephemeral Wetlands	Brigalow Woodland	Disturbed Brigalow Woodland	Brigalow Palustrine Wetland	Disturbed Brigalow Palustrine Wetland	Pre-cleared Grazing Paddock	Dams	Post-Winter	Post-Summer	
	Typhlopidae	*Ramphotyphlops sp.*				✓													0	0	0
	Typhlopidae	*Ramphotyphlops unguirostris*		C		✓													0	0	0
	Typhlopidae	*Ramphotyphlops wiedii*		C		✓													0	0	0
	Varanidae	*Varanus gouldii*	sand monitor	C		✓													0	0	0
	Varanidae	*Varanus tristis*	black-tailed monitor	C		✓													0	0	0
	Varanidae	*Varanus varius*	lace monitor	C		✓													0	0	0
	Total Number of Species																		15	21	27

[1]**Status:** E: Endangered, V: Vulnerable, NT: Near Threatened, LC: Least Concern, SPL: Special Least Concern, C: Common
[2]**Sources:** DEHP (2013a), Bird Data (2013),
[3]100km radius of study area post 1980
* Introduced Species
**Estimated Abundance

ATTACHMENT B

CONSERVATION SIGNIFICANT FLORA AND FAUNA SPECIES DATABASE RESULTS

Table B1
Conservation Significant Flora Species Database Results

Scientific Name	Conservation Status[1]		Source		
	NC Act	EPBC Act	DotE (2014)[2]	Qld Herbarium[3]	Atlas of Living Australia[4]
Bertya opponens	-	V	-	-	•
Bertya pedicellata	NT	-	-	•	-
Cadellia pentastylis	V	V	•	•	-
Cerbera dumicola	NT	-	-	•	•
Cyperus clarus	V	-	-	•	•
Grevillea hockingsii	V	-	-	•	•
Paspalidium scabrifolium	NT	-	-	•	
Solanum dissectum	E	-	-	•	•
Solanum elachophyllum	E	-	-	•	•
Solanum johnsonianum	E	-	-	•	•
Xerothamnella herbacea	E	E	-	•	•

1 Threatened Species Status under the NC Act and EPBC Act (current as of February 2014) V = Vulnerable; E = Endangered; NT = Near Threatened.

2 Department of the Environment (2014) *Protected Matters Search within the following search area: -24.0279, 149.6840; -24.0279, 149.91618; -24.2156, 149.91618; -24.2156, 149.68409*. Data Received: 6 January 2014.

3 Queensland Herbarium (2014) *HERBRECS Database.* Search Area: -23.45, 149.18; -23.45, 150.65; -24.71, 150.65; -24.71, 149.18. Data received: 8 January 2014

4 Atlas of Living Australia (2014) *Atlas of Living Australia database*. Website: http://spatial.ala.org.au/ Accessed: February 2014.

Table B2
Conservation Significant Fauna Species Database Results

Scientific Name	Common Name	Conservation Status[1]		Database Records					Recorded During previous Surveys at the BNCOP or Surrounds[7]
		NC Act	EPBC Act	DotE (2014)[2]	Queensland Museum (2014)[3]	Wildlife Online (2014)[4]	BirdLife Australia (2014)[5]	Atlas of Living Australia (2014)[6]	
Reptiles									
Strophurus taenicauda	Golden-tailed Gecko	NT	-	-	•	-	-	•	-
Delma torquata	Collared Delma	V	V	•	-	-	-	-	-
Paradelma orientalis	Brigalow Scaly-foot	V	-	-	•	-	-	•	-
Egernia rugosa	Yakka Skink	V	V	•	•	-	-	•	-
Ramphotyphlops broomi	Faint-striped Blind Snake	NT	-	-	-	-	-	•	-
Denisonia maculata	Ornamental Snake	V	V	•	•	-	-	•	B
Glyphodon barnardi	Yellow-naped Snake	NT	-	-	•	-	-	•	-
Furina dunmalli	Dunmall's Snake	V	V	•	-	-	-	-	-
Birds									
Stictonetta naevosa	Freckled Duck	NT	-	-	-	-	-	•	-
Tadorna radjah	Radjah Shelduck	NT	-	-	-	-	•	-	-
Nettapus coromandelianus	Cotton Pygmy-goose	NT	-	--	-	•	•	•	B
Ephippiorhynchus asiaticus	Black-necked Stork	NT	-	-	-	-	•	•	B
Botaurus poiciloptilus	Australasian Bittern	-	E	-	-	-	-	•	-
Falco hypoleucos	Grey Falcon	NT	-	-	-	-	-	•	-
Lophoictinia isura	Square-tailed Kite	NT	-	-	-	•	•	•	-
Accipiter novaehollandiae	Grey Goshawk	NT	-	-	-	-	-	•	-
Erythrotriorchis radiatus	Red Goshawk	E	V	-	-	-	-	•	-
Turnix melanogaster	Black-breasted Button-quail	V	V	•	-	-	•	•	-

Table B2 (Continued)
Conservation Significant Fauna Species Database Results

Scientific Name	Common Name	Conservation Status[1]		Database Records					Recorded During previous Surveys at the BNCOP or Surrounds[7]
		NC Act	EPBC Act	DotE (2014)[2]	Queensland Museum (2014)[3]	Wildlife Online (2014)[4]	BirdLife Australia (2014)[5]	Atlas of Living Australia (2014)[6]	
Rostratula australis	Australian Painted Snipe	V	E	•	-	-	-	•	-
Pedionomus torquatus	Plains-wanderer	V	V	-	-	-	-	•	-
Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	V	V	•	-	•	•	•	A, B
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	-	-	-	•	•	-
Lathamus discolor	Swift Parrot	E	E	-	-	-	-	•	-
Ninox strenua	Powerful Owl	V		-	-	-	•	•	-
Atrichornis rufescens	Rufous Scrub-bird	V	-	-	-	-	-	•	-
Climacteris erythrops	Red-browed Treecreeper	NT	-	-	-	-	-	•	-
Melithreptus gularis	Black-chinned Honeyeater	NT	-	-	-	•	•	•	-
Anthochaera phrygia	Regent Honeyeater	E	E	-	-	-	-	•	-
Neochmia ruficauda ruficauda	Star Finch	E	E	•	-	-	-	-	-
Poephila cincta cincta	Black-throated Finch	E	E	•	-	-	-	•	-
Mammals									
Tachyglossus aculeatus	Short-beaked Echidna	SLC	-	-	-	-	-	-	A
Dasyurus hallucatus	Northern Quoll	-	E	•	-	-	-	•	-
Phascolarctos cinereus	Koala	SLC	V	•	-	•	-	•	-
Onychogalea fraenata	Bridled Nailtail wallaby	E	E	-	•	-	-	•	-

Table B2 (Continued)
Conservation Significant Fauna Species Database Results

Scientific Name	Common Name	Conservation Status[1]		Database Records					Recorded During previous Surveys at the BNCOP or Surrounds[7]
		NC Act	EPBC Act	DotE (2014)[2]	Queensland Museum (2014)[3]	Wildlife Online (2014)[4]	BirdLife Australia (2014)[5]	Atlas of Living Australia (2014)[6]	
Mammals									
Petrogale penicillata	Brush-tailed Rock-wallaby	V	V	-	-	-	-	•	B
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	•	-	-	-	-	-
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	•	-	-	-	-	-
Chalinolobus picatus	Little Pied Bat	NT	-	-	-	-	-	•	B

1 Threatened species status under the Qld *Nature Conservation Act 1992* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (current as at 10 January 2014). CE = Critically Endangered, E = Endangered, V = Vulnerable, Ex = Presumed Extinct in region, NT = Near Threatened, SLC = Special Least Concern.

2 Department of the Environment (2014) *Protected Matters Search within the following search area: -24.0279, 149.6840;,-24.0279, 149.91618; -24.2156, 149.91618; -24.2156, 149.68409*. Data Received: 6 January 2014.

3 Queensland Museum (2014) *Zoology Data Search Request within the following search area: 23.45823, 149.18766; -23.45823, 150.65434; -24.71442, 150.65434; -24.71442, 149.18766*. Data Received: 7 January 2014.

4 Department of Environment and Heritage Protection (2014) *Wildlife Online Database Records within the Following Search Area: -24.0279, 149.6841; -24.0279, 149.9162; -24.2156, 149.9162; -24.2156, 149.6841*. Data Received: 6 January 2014.

5 BirdLife Australia (2014) *Database records within the following search area: -23.45823, 149.18766; -23.45823, 150.65434; -24.71442, 150.65434; -24.71442, 149.18766*. Data Received: 8 January 2014.

6 Atlas of Living Australia (2014) *Database records within the following search area: -23.45823, 149.18766; -23.45823, 150.65434; -24.71442, 150.65434; -24.71442, 149.18766*. Data Received: 7 January 2014.

7 Previous survey results recorded in the BNCOP Additional Footprint and surrounds have been sourced from the following:

A = Footprints Environmental Consultants (2012)

B = RPS Australia East (2013)

ATTACHMENT C

REVIEW OF CONSERVATION SIGNIFICANT FLORA AND FAUNA SPECIES RELEVANT TO THE BNCOP

Table C1
Review of Conservation Significant Flora Species

Scientific Name	Common Name	Conservation Status[1]		Relevance of the Species to the BNCOP locality
		NC Act	EPBC Act	
Flora				
Xerothamnella herbacea	-	E	E	This species was not predicted to occur in the BNCOP locality in the Protected Matters Search (Department of the Environment, 2014). This species was not identified within the BNCOP Additional Footprint during field surveys (RPS Australia East, 2014).
Cerbera dumicola	-	NT	-	*Cerbera dumicola* occurs across a range of habitats in central and southern Queensland (Qld Herbarium, 2012). Associated vegetation and species include *Flindersia australis*, *E. melanophloia and E. populnea*. This species was not recorded during the field surveys (RPS Australia East, 2014)
Cyperus clarus	-	V	-	*Cyperus clarus* grows in grassland or open woodland and is often associated with *Panicum queenslandicum* and *E. melanophloia* (Qld Herbarium, 2012). RPS (2014) did not record this species within the BNCOP Additional Footprint during the field surveys.
Bertya opponens	-		V	This species was not predicted to occur in the BNCOP locality in the Protected Matters Search (Department of the Environment, 2014). There is a database record for this species on the western side of the Dawson Range. Field surveys did not identify this species (RPS Australia East, 2014).
Bertya pedicellata	-	NT	-	This species is unlikely to occur within the BNCOP Additional Footprint as it is often recorded growing on rocky hillsides in eucalypt forest or woodland (Qld Herbarium, 2012), RPS (2014) did not record this species during the field surveys.
Grevillea hockingsii	-	V	-	No habitat for this species is present within the BNCOP Additional Footprint. *Grevillea hockingsii* is found on slopes in hilly sandstone country (Qld Herbarium, 2012).
Paspalidium scabrifolium	-	NT	-	No habitat for this species is present within the BNCOP Additional Footprint and this species was not recorded during the field surveys (RPS Australia East, 2014).
Solanum dissectum	-	E	-	Potential habitat for this species consists of open forest and woodland of Brigalow (*Acacia harpophylla*) (Qld Herbarium, 2012) which is present within the BNCOP Additional Footprint. Field surveys did not identify this species (RPS Australia East, 2014)
Solanum elachophyllum	-	E	-	*Solanum elachophyllum* grows on fertile cracking-clay soils in open forest of *E. thozetiana*, *A. harpophylla* (Qld Herbarium, 2012), Potential habitat for this species is present within the BNCOP Additional Footprint but field surveys did not record this species (RPS Australia East, 2014).
Solanum johnsonianum	-	E	-	*Solanum johnsonianum* is distributed within communities dominated or co-dominated by *A. harpophylla* (Brigalow), on heavy cracking soils (Qld Herbarium, 2012) which occurs within the BNCOP Additional Footprint. RPS (2014) did not record this species during the field surveys.

Table C1 (Continued)
Review of Conservation Significant Flora Species

Scientific Name	Common Name	Conservation Status[1]		Relevance of the Species to the BNCOP locality
		NC Act	EPBC Act	
Flora (Cont)				
Cadellia pentastylis		V	V	One record of this species occurs within the wider locality, approximately 50 km south-east of the BNCOP Additional Footprint (RPS Australia East, 2014). The BNCOP Additional Footprint contains Brigalow vegetation communities, however targeted searches did not to identify Ooline (RPS Australia East, 2014).

[1] Threatened species status under the Qld *Nature Conservation Act 1992* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (current as at 10 January 2014). CE = Critically Endangered, E = Endangered, V = Vulnerable, NT = Near Threatened, SLC = Special Least Concern.

Department of the Environment (2014) *Commonwealth Species Profile and Threats Database.*
Website: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
Date Accessed: March 2014.

Department of the Environment (2014) *Protected Matters Search within the following search area: -24.0279, 149.6840; ,-24.0279, 149.91618; -24.2156, 149.91618; -24.2156, 149.68409*. Data Received: 6 January 2014.

Queensland Herbarium (2012) *Specimen Label Information*. Queensland Herbarium. Accessed 20/03/2012.

RPS Australia East (2014) *Baralaba North Continued Operations Project Terrestrial Ecology Post Summer and Post Winter Baseline Survey Report*. Report prepared for Cockatoo Coal Limited.

Table C2
Review of Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Relevance of the Species to the BNCOP locality	Specifically Targeted By RPS Australia East (2014)
		NC Act	EPBC Act		
Reptiles					
Strophurus taenicauda	Golden-tailed Gecko	NT	-	This species has database records in six locations within an 80 km radius around the BNCOP (Figure 16).	-
Delma torquata	Collared Delma	V	V	There are no database records of this species within an 80 km radius around the BNCOP. There is some potential habitat for the species within the BNCOP Additional Footprint (e.g. eucalypt-dominated woodlands and open-forests on Land Zone 3 (Department of the Environment [DotE], 2014).	✓
Paradelma orientalis	Brigalow Scaly-foot	V	-	Mapped Essential Habitat occurs in the south-east of the BNCOP Additional Footprint (Figure 13). This species has database records in six locations within an 80 km radius around the BNCOP (Figure 16).	✓
Egernia rugosa	Yakka Skink	V	V	This species has database records in four locations within an 80 km radius around the BNCOP (Figure 16). There is some potential habitat for the species within the BNCOP Additional Footprint (e.g. open dry sclerophyll forest/woodland [DotE, 2014]).	✓
Ramphotyphlops broomi	Faint-striped Blind Snake	NT	-	There is a single database record of this species in the wider landscape, approximately 40 km to the north of the BNCOP Additional Footprint (Figure 16).	-
Denisonia maculata	Ornamental Snake	V	V	This species was recorded by RPS Australia East (2014). This species has database records in 11 locations within an 80 km radius around the BNCOP (Figure 16).	✓
Glyphodon barnardi	Yellow-naped Snake	NT	-	There are only two database records of the Yellow-naped Snake in the wider landscape, the closest of which is 25 km in habitat associated with the Dawson Range State Forest (Figure 16).	-
Furina dunmalli	Dunmall's Snake	V	V	No potential habitat within the BNCOP Additional Footprint and there are no database records of this species within an 80 km radius around the BNCOP (Figure 16).	✓
Birds					
Stictonetta naevosa	Freckled Duck	NT	-	There is a single database record of this species in the wider landscape, approximately 30 km to the north of the BNCOP Additional Footprint (Figure 17).	-
Tadorna radjah	Radjah Shelduck	NT	-	There is a single database record of this species in the wider landscape, approximately 80 km to the north-east of the BNCOP Additional Footprint (Figure 17).	-

Table C2 (Continued)
Review of Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Relevance of the Species to the BNCOP locality	Specifically Targeted By RPS Australia East (2014)
		NC Act	EPBC Act		
Birds (Cont)					
Nettapus coromandelianus	Cotton Pygmy-goose	NT	-	This species was recorded by RPS Australia East (2014). Scattered database records of this species occur in the wider locality, with a total of 18 database records (Figure 17).	✓
Ephippiorhynchus asiaticus	Black-necked Stork	NT	-	This species was recorded by RPS Australia East (2014). This species has database records along the river systems in the wider landscape (Figure 17).	✓
Botaurus poiciloptilus	Australasian Bittern	-	E	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). This species has not been recorded within approximately 20 km of the BNCOP Additional Footprint (Figure 17).	-
Falco hypoleucos	Grey Falcon	NT	-	There are three database records of the Grey Falcon in the wider landscape (Figure 17). The closest record occurs approximately 35 km to the north of the BNCOP Additional Footprint.	-
Lophoictinia isura	Square-tailed Kite	NT	-	There are 15 database records of this species occurring within an 80 km radius of the BNCOP Additional Footprint (Figure 17). The closest record is approximately 5 km south of the BNCOP Additional Footprint.	-
Accipiter novaehollandiae	Grey Goshawk	NT	-	The closest database record of the Grey Goshawk is approximately 25 km to the north-west of the BNCOP Additional Footprint in habitat associated with the Dawson Range State Forest (Figure 17).	-
Erythrotriorchis radiatus	Red Goshawk	E	V	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). Five database records exist within the wider locality with the closet record being approximately 15 km west of the BNCOP Additional Footprint (Figure 17).	✓
Turnix melanogaster	Black-breasted Button-quail	V	V	This species has not been recorded within approximately 20 km of the BNCOP Additional Footprint (Figure 17). No potential habitat for this species occurs in the BNCOP Additional Footprint.	✓
Rostratula australis	Australian Painted Snipe	V	E	Potential habitat for the Australian Painted Snipe does not occur within the BNCOP Additional Footprint. This species has not been recorded within approximately 60 km of the BNCOP Additional Footprint (Figure 17).	✓
Pedionomus torquatus	Plains-wanderer	V	V	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). There are no database records within 25 km of the BNCOP Additional Footprint (Figure 17).	-
Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	V	V	This species was recorded by RPS Australia East (2014). A large number of database records (approximately 20) occur with the wider locality indicating that this species is relatively common in this locality (Figure 17).	✓

Table C2 (Continued)
Review of Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Relevance of the Species to the BNCOP locality	Specifically Targeted By RPS Australia East (2014)
		NC Act	EPBC Act		
Birds (Cont)					
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	This species has been recorded ten times within the wider locality with the nearest record occurring approximately 35 km to the north-west of the BNCOP Additional Footprint (Figure 17).	-
Lathamus discolor	Swift Parrot	E	E	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). Only two database records of this species occur within the wider locality. The closest record is approximately 25 km north of the BNCOP Additional Footprint (Figure 17).	-
Ninox strenua	Powerful Owl	V		Database records indicate that this species has been recorded at five locations within the wider locality. All database records occur to the north of the BNCOP Additional Footprint with the closest record being approximately 30 km north (Figure 17).	-
Atrichornis rufescens	Rufous Scrub-bird	V	-	There is a single database record of this species in the wider landscape near the Roundstone State Forest (Figure 17).	-
Climacteris erythrops	Red-browed Treecreeper	NT	-	There is a single database record of this species in the wider landscape, approximately 35 km to the north of the BNCOP Additional Footprint (Figure 17).	-
Melithreptus gularis	Black-chinned Honeyeater	NT	-	The Black-chinned Honeyeater has database records along the Dawson River (Figure 17). Potential habitat for this species occurs in the BNCOP Additional Footprint.	✓
Anthochaera phrygia	Regent Honeyeater	E	E	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). There is a single database record of this species in the wider landscape, approximately 35 km to the north of the BNCOP Additional Footprint (Figure 17).	-
Neochmia ruficauda ruficauda	Star Finch	E	E	There is no potential habitat for this species within the BNCOP Additional Footprint. No records of this species occur within the wider locality (Figure 17).	✓
Poephila cincta cincta	Black-throated Finch	E	E	Potential habitat for the Black-throated Finch does not occur within the BNCOP Additional Footprint. There are only 2 database records within an 80 km radius of the BNCOP Additional Footprint with the closest record being within the Dawson Range State Forest (Figure 17).	-
Mammals					
Tachyglossus aculeatus	Short-beaked Echidna	SLC	-	This species was recorded by RPS Australia East (2014).	✓

Table C2 (Continued)
Review of Conservation Significant Fauna Species

Scientific Name	Common Name	Conservation Status[1]		Relevance of the Species to the BNCOP locality	Specifically Targeted By RPS Australia East (2014)
		NC Act	EPBC Act		
Mammals (Cont)					
Dasyurus hallucatus	Northern Quoll	-	E	No potential habitat in the BNCOP Additional Footprint. There is a single database record of this species within an 80 km radius around the BNCOP (Figure 18).	✓
Phascolarctos cinereus	Koala	SLC	V	There are only two database records of the Koala in the wider landscape, the closest of which is 30 km north-west in habitat associated with the Dawson Range State Forest (Figure 18).	✓
Onychogalea fraenata	Bridled Nailtail wallaby	E	E	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). There are six database records within the wider locality. These records are all to the north of the BNCOP Additional Footprint with the closest record occurring approximately 50 km north (Figure 18).	-
Petrogale penicillata	Brush-tailed Rock-wallaby	V	V	Species or species habitat is not likely to occur within the BNCOP Additional Footprint (DotE, 2014). Only two database records occur within an 80 km radius of the BNCOP Additional Footprint (Figure 18).The closest record is approximately 20 km north-west of the BNCOP Additional Footprint.	-
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	This species was recorded by RPS Australia East (2014).	✓
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	There is no potential habitat for this species within the BNCOP Additional Footprint. No database records of this species occur within an 80 km radius of the BNCOP Additional Footprint (Figure 18).	-
Chalinolobus picatus	Little Pied Bat	NT	-	There is a single database record of this species in the wider landscape from Overdeen State Forest (Figure 18).	✓

[1] Threatened species status under the Qld *Nature Conservation Act 1992* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (current as at 10 January 2014). CE = Critically Endangered, E = Endangered, V = Vulnerable, NT = Near Threatened, SLC = Special Least Concern.

Department of the Environment (2014) *Commonwealth Species Profile and Threats Database.*
Website: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
Date Accessed: March 2014.

Department of the Environment (2014) *Protected Matters Search within the following search area: -24.0279, 149.6840; ,-24.0279, 149.91618; -24.2156, 149.91618; -24.2156, 149.68409*. Data Received: 6 January 2014.

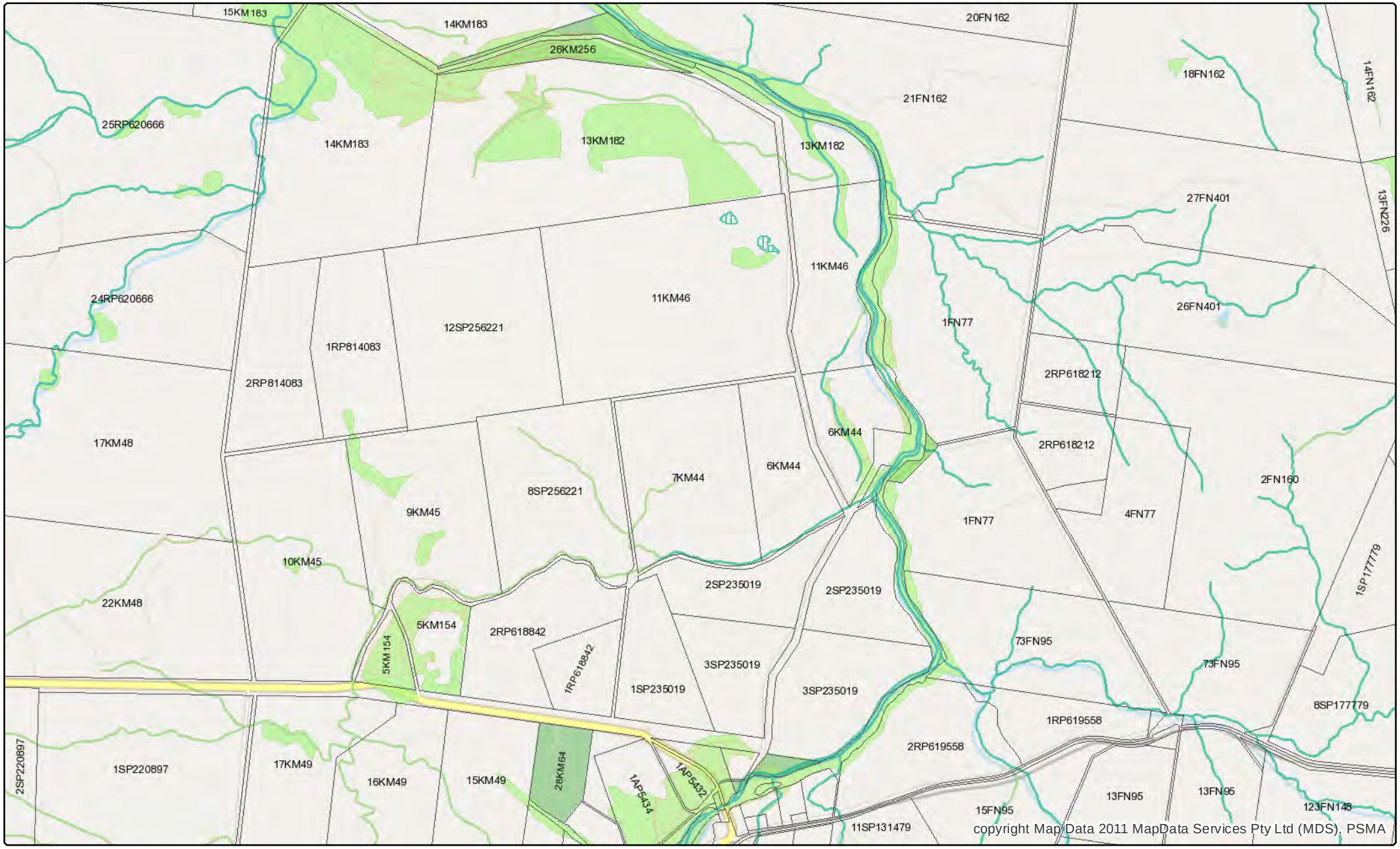
Queensland Herbarium (2012) *Specimen Label Information*. Queensland Herbarium. Accessed 20/03/2012.

RPS Australia East (2014) *Baralaba North Continued Operations Project Terrestrial Ecology Post Summer and Post Winter Baseline Survey Report*. Report prepared for Cockatoo Coal Limited.

ATTACHMENT D

MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE

(Department of State Development, Infrastructure and Planning, 2014)



State Planning Policy

Local government development assessment

Department of
State Development
Infrastructure and Planning

Queensland Government

N

Date: 06/03/2014

0 370 740 1,480 2,220 2,960
Metres

Disclaimer:
This map has been prepared with due care based on the best available information at the time of publication. The department holds no responsibility for any errors, inconsistencies or omissions within this document. Any decisions made by other parties based on this document are solely the responsibility of those parties.
Please note whilst Bushfire Hazard Areas have not been triggered they may still apply.

Legend

Cadastre (100k)

Cadastre (100k)

MSES - Wetlands (riverine)

MSES - Wetlands (riverine)

MSES - High ecological value waters (watercourse)

MSES - High ecological value waters (watercourse)

MSES - Regulated vegetation (intersecting a watercourse)

MSES - Regulated vegetation (intersecting a watercourse)

MSES - Wetlands (palustrine, estuarine and lacustrine)

MSES - Wetlands (palustrine, estuarine and lacustrine)

MSES - High ecological value waters (wetland)

MSES - High ecological value waters (wetland)

MSES - Wild Rivers (high preservation areas)

MSES - Wild Rivers (high preservation areas)

MSES - Wildlife habitat

MSES - Wildlife habitat

MSES - Protected area

MSES - Protected area

MSES - Marine park

MSES - Marine park

MSES - Declared fish habitat area

MSES - Declared fish habitat area

MSES - Regulated vegetation

MSES - Regulated vegetation

MSES - Legally secured offset area

MSES - Legally secured offset area

Queensland Government

Department of
State Development
Infrastructure and Planning

State Planning Policy

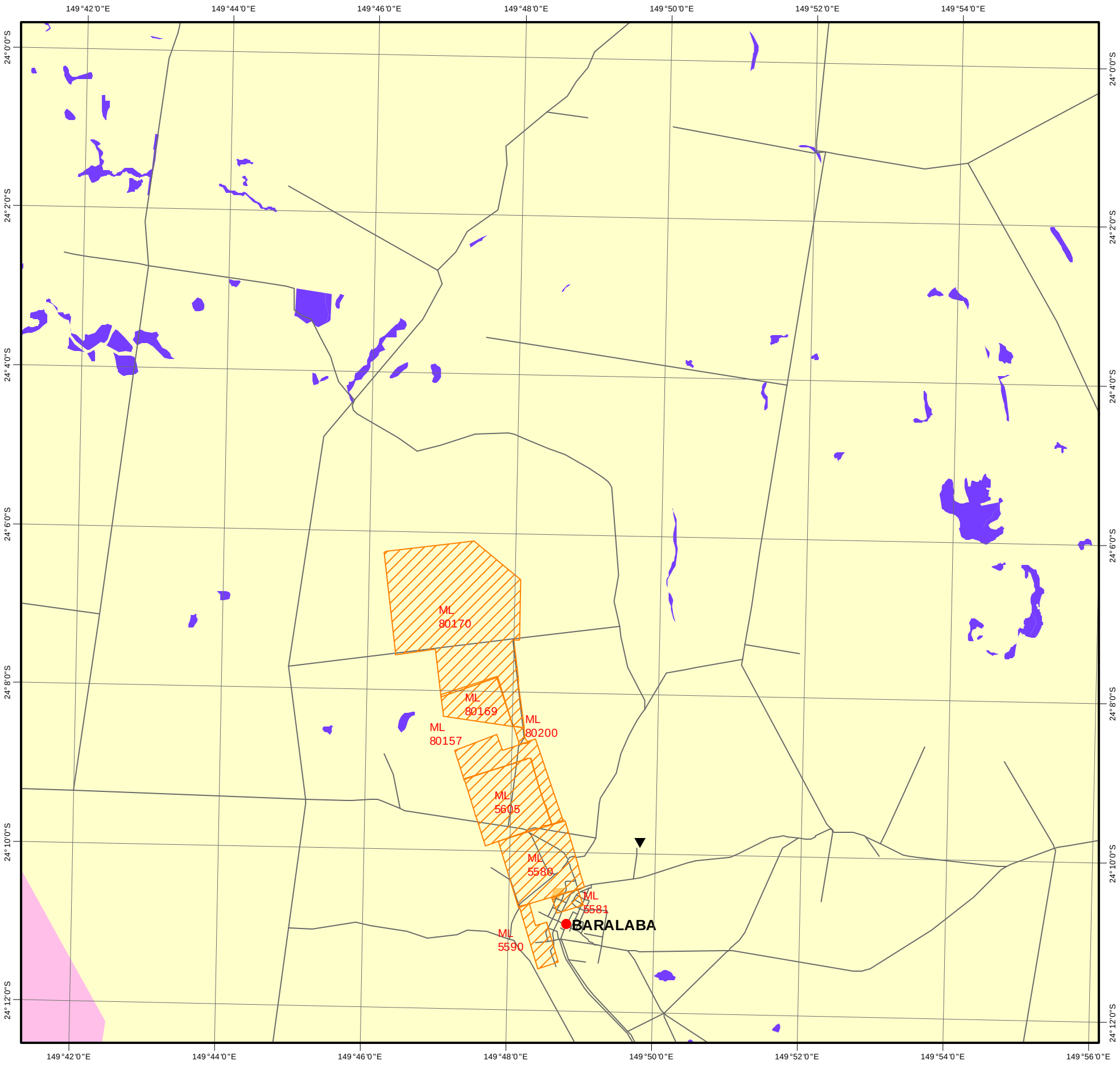
Local government development assessment

Date: 06/03/2014

ATTACHMENT E

ENVIRONMENTALLY SENSITIVE AREAS MAP

(Department of Environment and Heritage Protection, 2014)



ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

Requested By: JFITTELL@RESOURCESTRATEGIES.COM.AU

Date: 14 Mar 14 Time: 08.13.19

Centred on point position:
Latitude: -24.0997 Longitude: 149.81
(decimal degrees)

Mining Leases

CATEGORY A
- National Parks
- Conservation Parks
- Forest Reserves
- Wet Tropics World Heritage Area
- Great Barrier Reef Marine Park Area
- Marine Parks other than General Use Zones

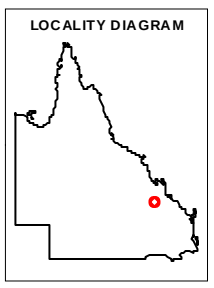
CATEGORY B
- World Heritage Areas
- Queensland Heritage Register Places
- Ramsar Sites
- Cultural Heritage Registered Areas and DLA's other than Stanbroke
- Special Forestry Areas
- Fish Habitat Areas
- Koala Plan
- Coordinated Conservation Areas
- Endangered Regional Ecosystems (Biodiversity Status)
- Marine Parks other than General Use Zones
- Marine Plants

CATEGORY C
- Nature Refuges
- Resources Reserves
- Declared Catchment Areas
- Declared Irrigation Areas
- Drainage Areas
- River Improvement Areas
- Stanbroke DLA
- State Forests
- Timber Reserves
- Coastal Management Control Districts
- Dams and Weirs

OTHERS
- Roads
- Towns
- Wild River Nominated Waterways
- Wild River High Preservation Areas
- Wild River Preservation Areas
- Mahogany Glider Habitat
- Directory of Important Wetlands
- Queensland

Queensland Government

LOCALITY DIAGRAM



N

0 1,300 2,600 3,900 5,200 6,500 m

This product is projected into GDA 1994 MGA Zone 55

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Regional ecosystem mapping (remnant biodiversity status) may incorporate amendments, resulting from property level assessments, to the release version of the mapping available on QGIS.

NOTE TO USER: Themes presented in this map are indicative only. Field survey may be required to verify the 'true' spatial extent and value. Not all environmentally sensitive areas are presented in this map. A user should refer to the particular circumstances relevant to their situation to assess the 'completeness' of themes provided.

The user should note that some boundaries and indicated values are ambient and may change over time (e.g. regional ecosystem boundaries and conservation status, watercourse mapping etc).

The user should be aware that due to multiple overlapping themes/ layers present, some themes/layers may be obscured by others. Ordering in the Legend does not accurately reflect the order by which themes/layers are displayed.