Carmichael Coal Mine and Rail Project
Supplementary Environmental Impact Statement

Volume 4, Appendix C3g – Species Management Plan

Containing

- Species Management Plan – Least Concern
- Species Management Plan – Threatened Species

Carmichael Coal Rail and Offsite Infrastructure Project

SPECIES MANAGEMENT PROGRAM (LEAST CONCERN, SPECIAL LEAST CONCERN AND COLONIAL BREEDERS)

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Carmichael Coal Mine and Rail Project

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Contents

1. Introduction

This Species Management Program (SMP) has been developed to facilitate appropriate management of 'special least concern' animals and 'colonial breeders' protected under the Queensland *Nature Conservation Act 1992* (NC Act) during construction and operation of the Carmichael Coal Rail and Offsite Infrastructure Project (the Project). The content and structure of this SMP meets the Queensland Department of Environment and Heritage Protection (DEHP) SMP guidelines. The content of this SMP:

- provides species specific information on the species covered by the SMP
- identifies potential impacts from the Project on these species
- recommends appropriate management measures to help avoid, mitigate and manage potential impacts on special least concern and colonial breeding animals during and after habitat disturbance required for the Project.

The structure of this SMP is as follows:

- Section 1 – Introduction and scope
- Section 2 – Terms of the SMP
- Section 3 – Assessment and impacts
- Section 4 – Management actions
- Section 5 – Monitoring and reporting
- Section 6 – Miscellaneous, including contact details
- Section 7 - References

This SMP covers species defined as special least concern animals under section 34 of the *Nature Conservation (Wildlife) Regulation 2006* and colonial breeders. A separate Threatened Species Management Plan covers 'endangered', 'vulnerable' and 'near threatened' (EVNT) species protected under the NC Act and/or the Commonwealth *Environment Protection and Biodiversity Conservation 1999* (EPBC Act) Act. Species occurring or likely to occur with the study area for the Project have been identified from ecological assessments undertaken for the Environmental Impact Statement (EIS) (GHD, 2012a; GHD, 2012b; CDM Smith, 2012a; GHD, 2013).

Adani Mining Pty Ltd (Adani) proposes to follow the DEHP generic SMP (**Appendix A**) for tampering with breeding places of 'least concern' animals protected under the NC Act, in accordance with section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*. Adani will register with DEHP for approval to operate under the generic SMP. Adani accepts the generic SMP in its current form and will abide by its conditions for construction and operation of the Project to mitigate impacts on 'least concern' wildlife.

The DEHP generic SMP does not apply to the following species:

- species defined as 'near threatened', 'vulnerable', 'endangered' or 'extinct in the wild' under the NC Act
- breeding places located in forest reserves or other protected areas
- breeding places (roosts) for flying-fox species
- special least concern animals including koala, echidna, platypus and migratory bird species listed under selected international agreements
- species classed as 'colonial breeders'.

1.1 Applicant

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1.2 Organisational summary

Adani Mining Pty Ltd (Adani) is the Proponent of the Project. Adani is an Australian subsidiary of Adani Enterprises Limited, a company based in Ahmedabad, India. Adani Enterprises Limited has diverse interests in global trading, development and operation of ports, inland container terminals, establishment of special economic zones, oil refining, logistics, gas distribution, power generation, transmission and trading.

Adani established in Australia in mid-2010 with the intent of exploring for, mining, and exporting coal resources. Accordingly, Adani initially purchased the right to seek a mining lease application (being MLA70441) over exploration permit for coal (EPC) 1690 and then secured similar rights to the eastern and northern parts of EPC1080 in December 2011. This was the initiation of development of the Project. Adani Abbot Point Terminal Pty Ltd (Adani APT), also an Australian subsidiary of Adani Enterprises Limited, has purchased the lease of Abbot Point Coal Terminal 1 and is seeking to develop Abbot Point Coal Terminal 0 as part of their overall program for export coal.

1.3 Activity

1.3.1 Project overview

Adani (the Proponent), commenced an EIS process for the Carmichael Coal Mine and Rail Project in 2010. On 26 November 2010, the Queensland (Qld) Office of the Coordinator General declared the Project a 'coordinated project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736). The Carmichael Coal Mine and Rail Project was assessed to be a controlled action on the 6 January 2011 under section 75 and section 87 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions include:

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Wetlands (Ramsar) (sections 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- The Great Barrier Reef Marine Park (GBRMP) (sections 24B & 24C).

The Qld Government's EIS process has been accredited for the assessment under Part 8 of the EPBC Act in accordance with the bilateral agreement between the Commonwealth of Australia and the State of Queensland.

The Proponent prepared an EIS in accordance with the Terms of Reference (ToR) issued by the Qld Coordinator-General in May 2011 (Qld Government, 2011). The EIS process is managed under section 26(1)

(a) of the *State Development and Public Works Act 1971* (SDPWO Act), which is administered by the Qld Government's Department of State Development, Infrastructure and Planning (DSDIP).

The EIS, submitted in December 2012, assessed the environmental, social and economic impacts associated with developing a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the northern Galilee Basin, approximately 160 kilometres (km) north-west of Clermont, Central Queensland, Australia. Coal from the mine will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Point of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

- The Project (Mine): a greenfield coal mine over EPC 1690 and the eastern portion of EPC 1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure.
- The Project (Rail): a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
  - Rail (west): a 120 kilometre (km) dual gauge portion running west from the Mine site east to Diamond Creek
  - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah
  - Quarries: the use of five local quarries to extract quarry materials for construction and operational purposes.

1.3.2 Project (Rail) description

A detailed description of the Project (Rail) is provided in Section 2 of the EIS (GHD 2012e). Main components relevant to this SMP are summarised below.

1.3.2.1 Location and components

The Project (Rail) alignment is located within a nominal 95 metre (m) wide corridor that runs from the terminal facilities within the boundary of the Mine to connect with the Wotonga Blair Athol Branch Railway of the existing Aurizon Goonyella Coal Rail System south of Moranbah (location of rail alignment is shown in **Appendix B**. The alignment is approximately 189 km long and runs west to east. The Project (Rail) sits wholly within the Isaac Regional Council (IRC) Local Government Area (LGA).

The Project (Rail) includes all project components necessary for the construction and operation of the greenfield rail system between the Mine site and the junction with the Goonyella rail system. It comprises of the following rail infrastructure:

Located within the 95m rail corridor:

- terminus facilities
- track (including earthworks, structures and track)
- passing loops
- signalling and communications

Located outside the 95m rail corridor:

- maintenance facilities (rolling stock and track)

- construction camps
- laydowns
- construction depot
- concrete batching plants
- turning circle
- bridge laydown
- track laydown
- quarries

The Project (Rail) is proposed to be delivered in two separable portions, namely Rail (west) and Rail (east). The Rail (west) portion is designed to accommodate a dual gauge (i.e. narrow gauge and standard gauge) with a capacity up to 100 Mtpa. The Rail (east) will be a narrow gauge track with capacity assessed at 60 Mtpa.

The Project (rail) will cross eighty-eight waterway crossings, including 12 major waterways. A standardised 15 or 20 m bridge span will be adopted for major waterway crossings. The Project (Rail) will also cross six dedicated public road reserves (constructed and unconstructed), three stock routes and four easements. Three treatment options will be adopted for the rail crossings. These options include grade separation (rail under road or rail over road), at grade active control (level crossings with active controls, i.e. flashing lights and sounds) or at grade passive control (level crossings with passive controls, i.e. signs and line markings). One road, Moray Carmichael Road will be realigned to run parallel to the rail line.

1.3.2.2 Construction

It is expected that construction of the Project (Rail) will commence in the early to mid 2014 for a period of approximately two years. Construction stages and activities include:

- site preparation including site clearance, construction camp establishment, installation of temporary and permanent fencing, installation of drainage and water management controls and construction of site access
- civil works including bulk earthworks, black soil treatment, construction of cuts and embankments, installation of permanent drainage controls, construction of temporary haul roads, establishment of concrete batching plants, bridge and water course crossing construction and development of quarries and borrow areas
- track works including installation of the rail, signalling infrastructure and maintenance infrastructure.

The construction schedule currently indicates that construction activities in the first year are largely concerned with the undertaking of civil works (earthworks and structures), such as the establishment of watercourse crossings. Yard works (i.e. maintenance yard, flash butt welding yard) are also scheduled during this period. Earthworks are planned to commence in 2014 and continue through to 2015. Track laying, followed by ballasting and tamping, will commence in 2014/15 and is scheduled for completion in 2016. The grade separation treatment at the Gregory Development Road is scheduled to commence in 2014. Passing loops will be constructed progressively in line with coal production and the requisite increased rail capacity required. To facilitate the Project (Mine) five passing loops will be required to be operational by 2018. A total of eight passing loops will provide sufficient operational capacity through to Project (Mine) peak production and transport of 60 Mtpa.

Quarries will be required to source construction materials for the Project (Rail). Five sites have been proposed as potential locations for extracting construction material. These include Disney, North Creek, Moray Pit, Back Creek, Borrow 7 and (location of quarries is shown in **Appendix B**.

Three temporary construction camps will be developed for the Project (Rail). The rail construction camps are located across the alignment with two camps located along the SP1 and one camp located in the SP2 (location

of construction camps is shown in **Appendix B**. Access roads will be constructed along the rail alignment from the closest road intersection to the camp sites.

1.3.2.3 Operation

In addition to the ongoing operation of the Project (Rail) components, track maintenance will be required, including:

- routine maintenance
- major periodic maintenance
- emergency response.

1.3.2.4 Decommissioning and rehabilitation

Decommissioning of the Project (Rail) will most likely occur after the closure of the Project (Mine), unless in use by third parties.

1.4 Applicable species

This SMP applies to special least concern animals defined under section 34 of the *Nature Conservation (Wildlife) Regulation 2006*, including migratory bird species listed under selected international agreements and colonial breeders identified within the study area of the Project (Rail). This SMP includes a total of 30 applicable species (nine terrestrial birds, nine wetland birds, one ground mammal and eleven mircochiropteran bats) that are listed in **Table 1-1**.

Table 1-1 Species included in the Species Management Program

Common Name	Scientific Name	NC Act Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
Terrestrial birds					
Apostlebird	*Struthidea cinerea*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplain and *Acacia* woodland and forest broad vegetation communities (BVCs)	Not recorded	Confirmed – recorded within the study area
Fork-tailed Swift	*Apus pacificus*	special Least concern - migratory bird species (JAMBA[1], CAMBA[2] and ROKAMBA[3])	Not recorded	Not recorded	Likely – potential habitat recorded within study area
Grey-crowned Babbler	*Pomatostomus temporalis*	colonial breeder	Confirmed - *Acacia* woodland or forest, open woodland fringing	Not recorded	Confirmed – recorded within the study area

[1] Bilateral migratory bird agreement between the Australian and Japanese Governments – Japan-Australia Migratory Bird Agreeement

[2] Bilateral migratory bird agreement between the Australian and Chinese Governments - China-Australia Migratory Bird Agreement

[3] Bilateral migratory bird agreement between the Australian Government and the Republic of Korea - Republic of Korea-Australia Migratory Bird Agreement

Common Name	Scientific Name	NC Act Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
			watercourses and on floodplains and in non-remnant vegetation BVCs		
Fairy Martin	*Petrochelidon ariel*	colonial breeder	Not recorded	Not recorded	Confirmed – recorded within the study area
Rainbow Bee-eater	*Merops ornatus*	special least concern – migratory bird species (JAMBA)	Confirmed – recorded in *Acacia* woodland or forest and in other locations along the alignment	Confirmed – was recorded at several quarries and potential nest burrows were located at North Creek Pit	Not recorded
Satin Flycatcher	*Myiagra cyanoleuca*	special least concern – migratory bird species (Bonn[4])	Likely – the species has been recorded on the Carmichael Mine	Unlikely - due to poor habitat for this specie occurring on the quarries	Not recorded
Tree Martin	*Petrochelidon nigricans*	semi-colonial breeder	Confirmed – was recorded within the rail alignment	Not recorded	Confirmed – recorded within the study area
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	special least concern – migratory bird species (CAMBA)	Likely – has been recorded at a nearby mine and potential habitat does occur within the alignment	Unlikely – no suitable habitat	Not recorded
White-throated Needletail	*Hirundapus caudacutus*	special least concern - migratory bird species (JAMBA, CAMBA and ROKAMBA)	Not recorded	Confirmed – recorded in surrounding area and likely to flyover the quarries	Not recorded
Wetland birds					
Black-tailed Godwit	*Limosa limosa*	special least concern - migratory bird species (JAMBA, CAMBA and ROKAMBA)	Not recorded	Not recorded	Likely – potential habitat recorded within the study area
Caspian Tern	*Hydroprogne caspia*	special least concern – migratory bird species (CAMBA)	Not recorded	Not recorded	Likely – potential habitat recorded within the study area
Common Greenshank	*Tringa nebularia*	special least concern - migratory bird species	Not recorded	Not recorded	Likely – potential habitat recorded within the study

[4] Convention on the Conservation of Migratory Species of Wild Animals

Common Name	Scientific Name	NC Act Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
		(JAMBA, CAMBA and ROKAMBA)			area
Common Sandpiper	*Actitis hypoleucos*	special least concern - migratory bird species (JAMBA, CAMBA, ROKAMBA and Bonn)	Not recorded	Not recorded	Likely – potential habitat recorded within the study area
Curlew Sandpiper	*Calidris ferruginea*	special least concern - migratory bird species (JAMBA, CAMBA, ROKAMBA and Bonn)	Not recorded	Not recorded	Likely – potential habitat recorded within the study area
Glossy Ibis	*Plegadis falcinellus*	special least concern - migratory bird species (Bonn, CAMBA)	Likely – preferred habitat was recorded within the rail alignment	Confirmed – recorded in surrounding area but not on quarry sites	Not recorded
Great Egret	*Ardea modesta*	special least concern - migratory bird species (JAMBA, CAMBA and ROKAMBA)	Confirmed – was recorded within the rail alignment	Confirmed – recorded in surrounding area but not on quarry sites	Confirmed – recorded within the study area
Latham's Snipe	*Gallinago hardwickii*	special least concern - migratory bird species (JAMBA, CAMBA, ROKAMBA and Bonn)	Not recorded	Not recorded	Likely – potential habitat recorded within the study area
Marsh Sandpiper	*Tringa stagnatilis*	special least concern - migratory bird species (JAMBA, CAMBA, ROKAMBA and Bonn)	Not recorded	Not recorded	Likely – potential habitat recorded within the study area
Ground Mammals					
Echidna	*Tachyglossus aculeatus*	special least concern	Confirmed – evidence recorded in open woodland fringing watercourses and on floodplains near the centre of the rail alignment	Not recorded	Confirmed – found in remnant woodland patch
Microchiropteran Bats					
Beccari's Freetail Bat	*Mormopterus beccarii*	colonial breeder	Confirmed - open woodland fringing	Not recorded	Not recorded

Common Name	Scientific Name	NC Act Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
			watercourses and on floodplains		
Chocolate Wattled Bat	*Chalinolobus morio*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Eastern Cave Bat	*Vespadelus troughtoni*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Gould's Wattled Bat	*Chalinolobus gouldii*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Inland Broad-nosed Bat	*Scotorepens balstoni*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Inland Forest Bat	*Vespadelus baverstocki*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Little Broad-nosed Bat / Northern Broad-nosed Bat	*Scotorepens greyii* / *S. sanborni*	colonial breeder	Confirmed on Anabat but unable to distinguish between species from calls - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Long-eared Bat	*Nyctophilus sp.*	colonial breeder	Not recorded	Not recorded	Confirmed but unable to distinguish species from calls - open woodland fringing watercourses and on floodplains
Northern Freetail Bat	*Chaerephon jobensis*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
White-striped Freetail Bat	*Austronomus australis*	colonial breeder	Confirmed - open woodland fringing watercourses and on floodplains	Not recorded	Not recorded
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	colonial breeder	Confirmed - open woodland fringing watercourses and	Not recorded	Not recorded

Common Name	Scientific Name	NC Act Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
			on floodplains		

Profiles of these species including description, habitat, breeding, feeding, status and distribution within the study area are provided in **Appendix C**.

The Koala (*Phascolarctos cinereus*), although listed as special least concern under the NC Act in Queensland, is listed as vulnerable under the EPBC Act (combined populations of Queensland, New South Wales and the Australian Capital Territory) and therefore is covered in the Threatened Species Management Plan for the Project.

1.5 Legislative framework

Under the NC Act, all native plants and most native animals are protected. The *Nature Conservation (Wildlife) Regulation 2006* lists the flora and fauna species considered extinct in the wild, endangered, vulnerable, near threatened, least concern, international and prohibited. It states the declared management intent and the principles to be observed in any taking of or destruction for each group.

Under Section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*, it is an offence to tamper with an 'animal breeding place' other than in accordance with an approved Species Management Program (SMP) or under a Damage Mitigation Permit. An 'animal breeding place' is defined in the *Nature Conservation (Wildlife Management) Regulation 2006* as follows:

> ***animal breeding place*** *- of an animal, means a bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring.*

DEHP offers an approved SMP, which entities can operate under for works tampering with animal breeding places. The approved SMP contains a number of conditions with which works are to comply and excludes interfering with animal breeding places associated with certain species, including species listed as extinct in the wild, endangered, vulnerable and near threatened, as well as special least concern or least concern colonial breeders as defined below:

i. Special least concern animals (such as koala, echidna, platypus and migratory bird species as defined by CAMBA, JAMBA or Bonn)

ii. Least concern (as listed in the *Nature Conservation (Wildlife) Regulation 2006*) and are colonial breeders and therefore whose broader populations are at greater risk from the impacts of events at a single location.

Where interfering with animal breeding places associated with extinct in the wild, endangered, vulnerable and near threatened species, DEHP's approved SMP does not apply and a separate threatened species specific SMP is required.

Where interfering with animal breeding places associated with special least concern or least concern colonial breeders species, DEHP's approved SMP does not apply and a separate species specific SMP is required

2. Terms

2.1 Terms of approval

This SMP applies to the construction and operational phases of Project (Rail). It covers special least concern (including migratory) and colonial breeding animals listed in **Section 1.4**. Adani intends to operate under the conditions of the DEHP approved SMP for tampering with animal breeding places of least concern animals. A Threatened Species Management Plan (TSMP) has been prepared to mitigate impacts on endangered, vulnerable and near threatened species.

This SMP is intended to be valid and in effect for three years after approval is granted by DEHP. Further approval will be sought from DEHP after three years if construction of the Project (Rail) is ongoing, and for track maintenance and operation works.

2.2 Approved parties

Adani and any of its employees, contractors or agents are authorised to operate under this SMP.

3. Assessment and Impacts

3.1 Assessment

3.1.1 Rail corridor

An ecological assessment of the Project (Rail) study area was completed for the preparation of the EIS. The study area comprised the rail corridor (95 m wide corridor encompassing the SP1 and SP2 rail alignments) and additional temporary infrastructure areas (i.e. laydown areas) and temporary construction camps outside the rail corridor (GHD, 2012b).

Terrestrial fauna surveys of the study area were conducted during May 2011 (autumn survey) and September 2011 (spring survey). Three survey types were used. During the May 2011 survey a total of two comprehensive surveys, 12 rapid site assessment surveys and a number of opportunistic surveys were conducted. During the September 2011 10 rapid site assessment surveys and a number of opportunistic surveys were conducted. Comprehensive surveys were not conducted during the September 2011 survey. Details of survey techniques for each survey type are described in **Table 3-1**.

Table 3-1 Details of survey techniques for the rail corridor

Comprehensive surveys	Rapid site assessment surveys	Opportunistic surveys
• Trapping: Elliot type A, cage traps, funnel traps and pit falls • Remote camera trap • Habitat assessment • Opportunistic search for wildlife traces • Standardised (20 min) bird survey • Active herpetofauna search • Anabat detector • Standardised spotlighting • Call playback for frogs and owls	• Habitat assessment • Opportunistic search for wildlife traces • Standardised (20 min) bird survey • Active herpetofauna search Some sites also had: • Anabat detector • Standardised spotlighting • Call playback for frogs and owls • Remote camera trap • Waterbody watch	• Remote camera trap • Waterbody watch • Opportunistic search for wildlife traces

3.1.2 Quarries

Fauna surveys for species of conservation significance were conducted at the five quarry locations (CDM Smith, 2013a). The quarries surveyed were:

- North Creek
- Moray Pit
- Back Creek
- Borrow 7
- Disney Quarry

These surveys were conducted from 29 January - 2 February 2013. The survey methodology consisted of rapid habitat value assessments, diurnal herpetofauna searches and continuous fauna observations for scats, tracks, feeding remains and other signs.

An additional Koala survey was conducted from 11 - 13 March 2013. This survey effort was focused on the Disney Quarry and Moray Pit. The methodology used for the koala survey consisted of dividing each site into transects and two observers walking the transect 15m apart using binoculars to assist in observations. This method was conducted on the Disney Quarry during the morning and afternoon and on the Moray Pit late

morning and afternoon. In addition to transects, a five-hour spotlighting survey was conducted on the Moray pit only.

All species encountered during the January/February and March surveys were recorded, not just the conservation significant species.

3.1.3 Offsite infrastructure

A late wet season/ early dry season ecological assessment of the offsite Infrastructure study area related to the Project was undertaken (GHD, 2013). This study area comprised the worker accommodation and airport, light industrial precinct, water infrastructure, Carmichael Road and the realigned balloon loop. A fauna survey was conducted 28 April 6 May 2013. The assessment consisted of two comprehensive fauna sites, 38 rapid fauna assessment sites, opportunistic sites and targeted threatened species surveys. Details of survey techniques for each survey type are described in **Table 3-2**.

Table 3-2 Details of survey techniques for offsite infrastructure

Comprehensive Survey	Rapid Site Assessment surveys	Other additional areas
• Trapping: Elliot type A, cage traps, funnel traps and pit falls, • Habitat assessment • Opportunistic search for wildlife traces • Three (3) - Standardise (20 min) bird survey • 1 hour of active herpetofauna search • 1 night minimum Anabat detector • Standardised spotlighting • Call playback for frogs and owls	• Habitat assessment • Opportunistic search for wildlife traces • One (1) - Standardise (20 min) bird survey • 30mins of active herpetofauna search Some sites also had: • 1 night minimum Anabat detector • Standardised spotlighting • Call playback for frogs and owls • Remote camera trap • Waterbody watch	• Remote camera trap • Waterbody watch • Opportunistic search for wildlife traces

Threatened species targeted searches were also conducted throughout the study area for the Black-throated Finch, Australian Painted Snipe, brigalow reptiles, Koala and Squatter Pigeon.

3.2 Impacts

The EIS (GHD, 2012a) identified a number of potential direct and indirect impacts from the Project (Rail) following the ecological assessments.

3.2.1 Construction phase impacts

Potential impacts to terrestrial and aquatic ecology values associated with the construction phase of the Project (Rail) were summarised into the following four broad categories:

- clearing of vegetation
- disturbances of surface watercourses and waterbodies
- increased anthropogenic activity leading to disturbance
- introduction of weed and pest animal species.

The impacts of each of the four categories above are summarised below.

3.2.1.1 Clearing of vegetation

Although the total extent of vegetation clearing required for the Project (Rail) was minimised in the design phase, residual impacts include:

- Loss of habitat (roosting, shelter, foraging and breeding) for fauna from clearing of vegetation for construction of the Project (Rail). Preliminary calculations state that approximately 1,868 ha of vegetation would be cleared encompassing the following vegetation community/fauna habitat types (areas impacted will be refined with detailed design):
  - 78 ha of eucalypt open woodland
  - 47 ha of *Acacia* woodland or forest
  - 35 ha of brigalow shrubland to open forest
  - 4 ha of eucalypt and *Acacia* mixed woodland or forest
  - 65 ha of open woodland fringing watercourses and on flood plains
  - 137 ha of native pastures or grasslands
  - 1,502 ha of open cleared land and regrowth
  - two dams; 12 major and 76 minor mapped watercourses.
- Degradation of habitat adjacent to and downstream of cleared areas. Edge effects may occur where previously intact remnant vegetation is exposed to distinct ecotones associated with construction or infrastructure. Clearing of vegetation will affect adjacent habitat through temporary, localised increases in noise, vibration, light and dust from construction works and through potential introduction and/or spread of weeds and pest animals.
- Habitat fragmentation and reduction in connectivity. Habitat fragmentation from construction of the rail corridor may reduce the capacity of some less mobile fauna to move within and between habitats.
- Fauna mortality. Construction activities involved in the clearing of vegetation, including the use of vehicles and machinery, have the potential to lead directly to mortality of fauna. Arboreal and ground fauna are particularly at risk, especially those that roost in hollows, or shelter beneath rocks, logs and bark.

3.2.1.2 Disturbances of surface watercourses and waterbodies

Twelve (12) major and approximately 76 minor watercourse crossings have been identified along the rail corridor (see Section 5.3.1 of the EIS for watercourse crossing details) as well as two farm dams. Impacts on aquatic and riparian habitat from construction of the Project (Rail) include:

- Loss of aquatic and riparian habitat associated with the watercourse crossings and the two farm dams.
- Degradation of aquatic and riparian habitat. Construction works in close proximity to watercourses/waterbodies have the potential to disturb bed and bank substrates affecting water quality and surface flows. This may affect the quality of the surface water for aquatic fauna.
- Aquatic fauna mortality. Construction activities within or adjacent to watercourses/waterbodies have the potential to injure aquatic fauna.

3.2.1.3 Increased anthropogenic activity leading to disturbance

Habitat degradation, behavioural disruption, injury and mortality may arise as a result of increased vehicular movements and construction activities within the construction footprint. Potential ecological impacts include:

- Fauna behavioural disruption associated with habitat degradation. Construction activities at and near the construction zones may disrupt local fauna behaviour, largely as a result of increased exposure to light, noise, dust, vehicles and people. These disruptions may be direct (i.e. increased predation due to noise or

increased prey detectability) or indirect (i.e. habitat degradation reducing available resources). Furthermore, human settlements in the form of construction camps have the potential to facilitate increases in the populations of pest animals.

- Fauna mortality. General vehicle and machinery movements have the potential to lead to fauna injury or death. Open pits and trenches in the construction zones are also a hazard for fauna.
- Change in fire regime and risk of fire. Increased human activity has the potential to alter the natural fire regime (i.e. welding and similar activities could cause bushfire incidents which can result in significant mortality of native fauna).

3.2.1.4 Introduction of weed and pest animal species

Increased access to construction zones and associated construction activities such as vegetation clearing and soil disturbance can facilitate the introduction and spread of weeds and pest animals. Weeds and pest animals can have adverse impacts on the fauna diversity of a region and disrupt ecosystems by outcompeting or predating on native species.

3.2.2 Operations phase impacts

Potential impacts to terrestrial and aquatic ecology values associated with the operation phase of the Project (Rail) were summarised into the following four broad categories:

- barrier to movement
- disturbance of surface watercourses and waterbodies
- increased anthropogenic activity leading to disturbance
- introduction of weed and pest animal species

The impacts of each of the four categories above are summarised below.

3.2.2.1 Barrier to movement

The Project (Rail) will create a permanent linear barrier across the landscape for fauna movement. Although the land surrounding the Project has been subject to land clearing, important wildlife corridors have been retained throughout the study area. Fauna mortality as a result of vehicle strikes and other operational activities is also likely to have an adverse impact on native fauna values within the Project (Rail) footprint. These barriers to movement can affect fauna through:

- Habitat fragmentation. Railway operations may reduce the ability for fauna to disperse across the landscape, particularly where remnant vegetation that provides corridors for fauna movement (i.e. riparian corridors) are intersected, by creating a permanent linear barrier. Habitat fragmentation also has the potential to decrease connectivity, introduce edge effects and reduce the size of habitat patches.
- Fauna mortality. The main risk to fauna from the operational phase of the Project (Rail) relates predominantly to train and maintenance vehicle strikes.

3.2.2.2 Disturbance of surface watercourses and waterbodies

The operational phase of the Project (Rail) has the potential for on-going impacts to surface watercourses and waterbodies located within and downstream of the Project (Rail) footprint. Potential impacts include:

- Change in aquatic habitat availability and/or suitability for terrestrial and aquatic species. Minor, localised runoff and sedimentation may occur throughout the operational life of the project which may reduce water quality and introduce pollutants.
- Changes to floodplain hydrology. The Project (Rail) footprint is typically located in a low gradient catchment with extensive floodplains (railway crosses 12 major and 76 minor watercourses). Extensive flooding is

possible and the railway may, therefore, create a barrier to the flow of water. This may impact downstream locations and species dependent on floodplain processes, such as wetland birds.

3.2.2.3 Increased anthropogenic activity leading to disturbance

Cattle grazing is the predominant land use in the surrounding landscape of the Project (Rail). The Project (Rail) will change the land use of the study area and immediate surrounds. Most notably, habitat fragmentation and faunal disturbance are likely to increase due to operation of the railway, and to a lesser extent, increased human activity within the study area. Potential impacts include:

- Fauna behavioural disruption. Train operations and track maintenance at and near the disturbed areas may disrupt local fauna behaviour, largely as a result of increased exposure to light, noise, dust, vehicles and people. These effects may be direct or indirect, as in **Section 3.2.1.3**. It is not proposed that the railway is lit, except for the balloon loop and maintenance facility which will be lit 24 hours a day. The other areas that are expected to be lit include the construction work front, construction camps, quarries and construction depot. Noise/dust generated through operations are predicted to be within operational limits. Noise and dust created by activities, such as maintenance, will be localised to the area of activity and be short in duration.
- Habitat degradation. Coal being transported along the railway could emit dust which may affect terrestrial and aquatic habitat where it settles potentially increasing sedimentation in waterways and supressing the growth of vegetation that the dust may blanket.
- Changes to fire regime. Increased human activity may alter the fire regime e.g. the rail and infrastructure corridor may act as a fire break and consequently reduce the extent of fire and in turn increase the fuel load which would increase the fire risk for the region. The potential for accidentally-lit fires is potentially increased through sparks from train operations. The incidence of regulated ‘management burns’ may also change in frequency. Accidental or uncontrolled fires have the potential to negatively impact upon vegetation (and habitat) within, and adjacent to, the rail and infrastructure corridor in particular.

3.2.2.4 Introduction of weed and pest animal species

Increased movement of people, vehicles, machinery, vegetation waste and soil may facilitate the spread of weeds and pest animals. The introduction of weeds and pest animals in the rail and infrastructure corridor may lead to increased competition for resources, increased predation and habitat degradation.

4. Management actions

4.1 General management actions

4.1.1 Construction

Management and mitigation measures to reduce impacts on terrestrial habitat and fauna within the construction footprint and surrounding adjacent landscape include:

- Locate where possible temporary and permanent infrastructure within previously disturbed/degraded areas and/or cleared, non-remnant land to avoid remnant vegetation (in particular endangered and of concern REs).
- The construction footprint will be reduced in environmentally sensitive areas, particularly at river and creek crossings.
- All vegetation clearing will be supervised by a qualified fauna spotter-catcher. Pre-demarcated habitat features will be thoroughly checked by fauna spotter-catcher prior to clearing.
- Prior to vegetation clearing, trees and habitat features such as hollows and log piles that may be used by fauna for nesting or shelter will be marked and where possible salvaged and placed in adjacent, intact habitat areas. Where this is not possible, the loss of habitat features will be supplemented in adjacent habitat areas with artificial habitat (i.e. nest boxes, artificial water sources).
- A fauna species relocation plan will be developed to facilitate relocation of fauna individuals according to species requirements prior to the commencement of clearing (particularly if conservation significant fauna species are encountered during clearing activities).
- A fauna mortality register will be maintained to document the location and frequency of mortality and the fauna species most susceptible to injury and death, to enable on-going modifications to fauna conservation management strategies where necessary.
- Vegetation clearing will be undertaken in a sequential manner to allow more mobile fauna species the opportunity to disperse away from cleared areas and clearing activities
- As soon as possible after cleared areas are no longer required (areas outside of the rail corridor), suitable rehabilitation will commence using flora species of local provenance and species appropriate to the cleared regional ecosystems. Management of previously disturbed land should occur in accordance with a Project Land Rehabilitation Plan proposed to be developed for the Project (Rail). This plan should provide key performance indicators and detail how the disturbed land will be managed and rehabilitated, including (but not limited to) details regarding seed collection, restoration of soil structure, weed management, flora regeneration and landscape design.
- Vegetation clearing activities will, where possible, seek to avoid alteration to waterways such that the impacts to water quality and downstream flows are minimised to the greatest extent possible. Management of erosion and sedimentation in and adjacent to cleared areas must be undertaken in accordance with a Project Erosion and Sediment Control Plan proposed to be developed for the Project (Rail).
- Temporary fencing should be erected around construction zones to exclude fauna and livestock.
- Where fencing is required around cleared areas, it will be designed such that fauna can move through it to retain landscape permeability where possible (excluding those instances where fenced areas seek to protect fauna from construction zones, i.e. trains, trenches, human contact). Consideration should be given to not using barbed wire on the top strand of wire fences or suitable fencing to maintain a level of landscape permeability.
- All vehicles and plant must adhere to site rules relating to speed limits. Speed limits will be restricted, and clearly signposted so as to minimise the potential for road kill.
- Reduce the number of construction vehicles mobilising to and from site daily – retain vehicles within the construction zone and transfer personnel by means of bus to and from the work front daily to reduce the exposure for animal strike in areas away from the construction footprint.

- Site inductions for all staff are to include education sessions regarding the local fauna that may be present on the site and protocols to be undertaken if fauna are encountered
- Work areas will be inspected daily for fauna that may have become trapped before work commences each day, and fauna present to be relocated or moved.
- If any pits/trenches are to remain open after daily site works have been completed, they will be fenced, covered by an impenetrable barrier, or if possible, fauna ramps should be put in place to provide a potential means of escape for trapped fauna.
- Limit lighting to work areas and employ directional lighting where lighting is required in areas near remnant vegetation, to avoid disturbance to sensitive habitat (i.e. watercourses and wetlands/ox-bows).
- Ensure all construction machinery and plant and equipment is appropriately serviced and maintained to minimise machinery noise where possible.
- Dust suppression during construction in cleared areas and on unsealed roads at suitably regular intervals, and the use of stabilised surfaces where possible.
- Management of weeds in and adjacent to cleared areas in accordance with a Project Pest and Weed Management Plan proposed to be developed for the Project (Rail). This plan should include details relating to the monitoring, management and where necessary, eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols.
- Management of fauna pest species during construction in and adjacent to cleared areas in accordance with a Project Pest and Weed Management Plan proposed to be developed for the Project (Rail). This plan should include details relating to the monitoring and management of pest animals. Camps and laydown areas to be fenced to prevent encroachment of feral species. Waste material to be appropriately sealed and stored to discourage encroachment by feral species.
- Develop and implement a Project Waste and Hazardous Materials Management Plan, which will include waste management and disposal protocols and procedures.
- Implementation of the Project Fire Management Plan that has been developed for the Project to address and minimise fire hazards. Ecological considerations will be incorporated into the development of this plan and response procedures developed.

Management and mitigation measures to reduce impacts on riparian and aquatic habitats from construction of the Project (Rail) include:

- Where possible construction within rivers and creeks to be undertaken in the drier periods and ahead of rail construction. This will reduce disturbance and interference to surface flows and subsequent impacts on aquatic habitats.
- Route selection identified watercourse areas (amongst others) as constraints and sought to minimise impacts to watercourses through avoidance, selection of suitable bridge spans or location in narrower crossing areas, crossing of a tributary rather than the main waterbody, etc.
- Avoid and minimise human and vehicle access to river and creek bed and banks. Construction of river/watercourse crossings ahead of rail construction (as far as is possible) will reduce the need for personnel, equipment, machinery and plant to traverse the river/watercourse and limit disturbance to bed and banks.
- Temporary stream or channel diversion may be required to facilitate activities in wet periods. Stream flow is maintained to provide connectivity between aquatic habitats and facilitate aquatic fauna passage.
- Design and layout of the components of the infrastructure will maximise development on existing cleared lands as priority to avoid impacts to the creek bed, banks and riparian areas and the aquatic values that may be provided when inundated (mainly during high water flows).
- Clear, on-ground demarcation of areas to be cleared adjacent to watercourse crossing locations will be undertaken prior to clearing to avoid accidental clearing or stockpiling of cleared vegetation in sensitive areas. Identification of this area for protection where possible will minimise the potential for unnecessary impact to the creek and consequently downstream areas.

- Disturbance to creek banks and control of site runoff from all areas disturbed during construction activities will be managed through the development and implementation of a Project Sediment and Erosion Control Plan. This plan will limit the potential for the degradation of downstream aquatic habitat.
- Design and layout of watercourse crossings will consider the requirement for fish movement including under flow conditions. This will be done in accordance with Department of Agriculture, Fisheries and Forestry guidelines for the design of stream crossings (Cotterell, 1998) for fish passage.
- To avoid mortality of aquatic fauna within farm dams impacted by construction activities, a Fauna Salvage and Relocation Plan will be required. Relocation would require preliminary sampling of dams to identify the native species present, followed by the development of an appropriate salvage plan for approval by the relevant agencies prior to removal of the habitat. The plan will require consideration of the relocated location in terms of suitability and availability of habitat and resources for the community.
- To avoid mortality of aquatic fauna within higher order watercourses (namely, Belyando River, Mistake Creek, Logan Creek and Diamond Creek) construction activities will be undertaken during dry conditions where possible.

4.1.2 Operation

Management and mitigation measures to reduce impacts on terrestrial habitat and fauna during the operation phase of the Project include:

- Rehabilitate and reduce operational areas in the vicinity of watercourse crossings and where possible reinstate riparian habitat below infrastructure.
- Implementation of the Fauna Crossing Strategy that has been developed for the Project. This includes installation of fauna underpasses at targeted locations along the rail corridor that enable the safe crossing of fauna (in particular macropods, quolls and small mammals) across the rail corridor. Fauna underpasses will be colocated with culverts, bridges, particularly in important habitat areas and bioregional corridors (i.e. riparian corridors). For example culverts to facilitate movement of fauna (e.g. incorporation of fauna furniture, allow for natural light through use of grids, rehabilitation of entries and exits, fauna exclusion fencing to guide fauna through the underpass) are advised to be installed where the Project bisects watercourses, drainage lines and remnant vegetation, including the areas mapped as potentially suitable habitat for threatened species which are considered likely to occur. The suitability of culvert size will be a consideration during detailed design of crossing structures. For example, when targeting common fauna such as macropods, larger culverts will encourage use. Monitor the use of underpasses by fauna.
- Install fencing along the rail corridor to restrict fauna movement within and across the rail corridor. Consideration should be given to reducing the chance of fauna mortality by avoiding the use of barbed wire on the top strand of wire fences.
- Incidents of fauna strike and mortality are to be monitored during construction and operation of the rail line.
- Management of weeds in and adjacent to cleared areas in accordance with a Project Pest and Weed Management Plan. This plan will include details relating to the monitoring, management and where necessary eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols.
- Management of fauna pest species in and adjacent to cleared areas in accordance with a Project Pest and Weed Management Plan. This plan should include details relating to the monitoring, management and where necessary eradication of pest animals.
- Lighting is not proposed along the railway with the exception of the balloon loop and maintenance facility which will be lit 24 hours a day. The other areas that are expected to be lit include the construction work front, construction camps, quarries and construction depot. Lighting at the maintenance facility will be shielded to avoid lighting non-operational areas unnecessarily.
- Operation staff and maintenance personnel will remain within the operation footprint and make use of designated access and tracks at all times.
- Coal dust from train operations will be managed by development and implementation of a Project Coal Dust Management Plan.

- Management of fauna pest species in and adjacent to cleared areas in accordance with a Project Pest and Weed Management Plan. This plan should include details relating to the monitoring and management of pest species.
- Management of weeds in and adjacent to cleared areas in accordance with a Project Pest and Weed Management Plan. This plan should include details relating to the monitoring, management and where necessary eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols.
- All plant and equipment brought onto site will be cleaned and weed free. Wash downs between construction areas (as appropriate) will be undertaken during construction and in accordance with landholder agreements.
- Implementation of the Project Fire Management Plan that has been developed for the Project. As well as documenting protocols and actions for preventing accidentally-lit fires, this plan should outline how fuel loads will be monitored and maintained across the Study Area. Ecological considerations will be incorporated into the development of this plan and response procedures developed.

Management and mitigation measures to reduce changes in aquatic habitat availability and/or suitability for terrestrial and aquatic species during operation activities include:

- Ensure all permanent erosion and sediment control devices are functional prior to commencement of railway operation and maintain and repair all devices throughout the life of the Project.
- Current best practice for erosion and sediment control measures will be taken in accordance with the 2008 International Erosion Control Association's Best Practice Erosion and Sediment Control Guidelines (2008) to minimise the potential for sedimentation of receiving waters.
- Trains should remain clean and be maintained to minimise the introduction of contaminants such as oil and fuel.
- A Waste and Hazardous Materials Management Plan will be developed and implemented and will include fuel and chemical storage protocols and spill responses.
- Rehabilitate and maintain aquatic habitats and riparian areas in accordance with rehabilitation plans for a period of 1 year post construction.

4.2 Species management actions

Species management actions are detailed in **Table 4-1** and will be undertaken in the following order:

1) Where possible schedule the clearing to be outside the main breeding season of applicable species.
2) Pre-clearing surveys: the following staged approach to the pre-clearing surveys will be undertaken to minimise impacts on breeding species:
    - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences.
    - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species**,** as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates.
3) Avoidance: where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor.

4) Care: where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer.

5) Relocation: inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. Where possible the inactive breeding structure will be placed at a similar height.

6) Offset: hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision.

All vegetation and habitat clearing will be undertaken in accordance with the survey and clearing procedures outlined for each species group in **Table 4-1**.

Table 4-1 Species Management Actions

Name	Potential Impacts	Management Actions			
		Prior to clearing	**During clearing**	**During construction**	**During operations**
Terrestrial birds: • Apostlebird • Fork-tailed Swift • Grey-crowned Babbler • Tree Martin • Fairy Martin • Rainbow Bee-eater • Satin Flycatcher • White-bellied Sea-Eagle • White-throated Needletail	• Clearing of vegetation and habitat • Increased anthropogenic activity leading to disturbance • Introduction of weeds and pest animals	• In the non-breeding season prior to clearing activities, pre-clearing survey of native vegetation and habitat will be undertaken by a suitably qualified ecologist to search for inactive breeding places of terrestrial birds. Where possible, inactive breeding places (i.e. nests) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. • 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher	• Where possible schedule clearing activities to avoid the main spring/summer breeding season of native fauna species. • Clearing will be carried out in a sequential manner and in a way that directs escaping wildlife away from the construction footprint into adjacent native vegetation or habitat. • All clearing will be conducted in such a way that will prevent the isolation of habitat or habitat features. • Fauna spotter-catcher will be present during any vegetation clearing. • Fauna spotter-catcher will develop a Rehabilitation Plan for any fauna to be translocated including identification of suitable relocation site and would relocate the species into suitable habitat away from the construction footprint. • Fauna spotter-catcher will keep an inventory of any fauna species encountered with details of species, capture and release condition and capture and release	• Reduce the construction footprint in riparian and forested areas. • Locate where possible temporary and permanent infrastructure outside of riparian and forested areas within the construction footprint. • Ensure that construction work areas do not afford habitat value to fauna (i.e. open roof cavities, material stockpiles). Entrances to any such areas should be barricaded to exclude entry/habitation by fauna. • Weed and pest management.	• Installation of nest boxes in accordance with nest box management plan for hollow-nesting birds. • Rehabilitate cleared areas no longer required to provide fauna habitat for a diversity of species as soon as possible after works are finished in the area. • Monitoring of relocated habitat (i.e. inactive nests, hollows) and artificial habitat (nest boxes) for use by hollow-nesting birds.

Name	Potential Impacts	Management Actions			
		Prior to clearing	**During clearing**	**During construction**	**During operations**
		using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • If individuals are identified, their location will be recorded and they will be observed until they vacate the clearing footprint. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Where an inactive breeding place is found, a licensed	GPS co-ordinates (**Appendix D**).		

Name	Potential Impacts	Management Actions			
		Prior to clearing	**During clearing**	**During construction**	**During operations**
		fauna spotter-catcher to remove and relocate inactive breeding structure where feasible into adjacent habitat and place at a similar height. • Develop a nest box management plan for hollow-nesting birds to compensate removal of hollow-bearing trees.			
Wetland birds: • Black-tailed Godwit • Caspian Tern • Common Greenshank • Common Sandpiper • Curlew Sandpiper • Glossy Ibis • Great Egret • Latham's Snipe • Marsh Sandpiper	• Clearing of vegetation and habitat • Increased anthropogenic activity leading to disturbance • Introduction of weeds and pest animals • Degradation of surface water quality and wetland habitats	• In the non-breeding season prior to clearing activities, pre-clearing survey of wetland habitat will be undertaken by a suitably qualified ecologist to search for inactive breeding places (i.e. nests) of wetland birds. Where possible, inactive breeding places will be removed and relocated into adjacent habitat and placed at a similar height. • 24 hours prior to clearing activities a pre-clearing survey of wetland habitat will be undertaken by a licensed fauna spotter-catcher t to check for presence of applicable species, as well as their breeding places (i.e. nests).	• Where possible schedule clearing activities to avoid the main spring/summer breeding season of native fauna species. • Clearing will be carried out in a sequential manner and in a way that directs escaping wildlife away from the construction footprint into adjacent native vegetation or habitat. • All clearing will be conducted in such a way that will prevent the isolation of habitat or habitat features. • Fauna spotter-catcher will be present during any vegetation clearing and initial disturbance to watercourses and water bodies due to waterway works. • Fauna spotter-catcher will develop a Rehabilitation Plan for any fauna	• Reduce the construction footprint in riparian and wetland areas. • Locate where possible temporary and permanent infrastructure outside of riparian and wetland areas within the construction footprint. • Develop and implement sediment and erosion control plan to prevent any stormwater quality impacts to watercourses and water bodies. • Weed and pest management.	• Rehabilitate cleared areas no longer required to provide fauna habitat for a diversity of species as soon as possible after works are finished in the area. • Monitoring of relocated habitat (i.e. inactive nests) for use by wetland birds.

Name	Potential Impacts	Management Actions			
		Prior to clearing	**During clearing**	**During construction**	**During operations**
		• If individuals are identified, their location will be recorded and they will be observed until they vacate the clearing footprint. • Where possible avoid tampering with habitat and breeding places (i.e. nests) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Where an inactive breeding place is found, a licensed fauna spotter-catcher to remove and relocate inactive breeding structure where	to be translocated including identification of suitable relocation site and would relocate the species into suitable habitat away from the construction footprint. • Fauna spotter-catcher will keep an inventory of any fauna species encountered with details of species, capture and release condition and capture and release GPS co-ordinates (**Appendix D**).		

Name	Potential Impacts	Management Actions			
		Prior to clearing	**During clearing**	**During construction**	**During operations**
		feasible into adjacent habitat and place at a similar height.			
Ground mammals: • Echidna	• Clearing of vegetation and habitat • Increased anthropogenic activity leading to disturbance • Introduction of weeds and pest animals	• In the non-breeding season prior to clearing activities, pre-clearing survey of habitat including inspection of thick vegetation, in hollow logs and rock crevices will be undertaken by a suitably qualified ecologist to search for inactive breeding places (i.e. burrows) of echidna. Where possible, the burrow will be removed and relocated into adjacent habitat or destroyed to avoid recolonisation before the clearing commences. • 24 hours prior to clearing activities a pre-clearing survey of habitat will be undertaken by a licensed fauna spotter-catcher t to check for presence of echidna, as well as their breeding places (i.e. nursery burrows). • If individuals are identified, their location will be recorded and they will be observed until they vacate the clearing footprint.	• Where possible schedule clearing activities to avoid the main spring/summer breeding season of Echidna. • Clearing will be carried out in a sequential manner and in a way that directs escaping wildlife away from clearing and into adjacent native vegetation or habitat. • All clearing will be conducted in such a way that will prevent the isolation of habitat or habitat features. • Relocate habitat features (i.e. hollow logs, rocks) into adjacent habitat. • Fauna spotter-catcher will be present during any vegetation clearing. • Fauna spotter-catcher will develop a Rehabilitation Plan for any fauna to be translocated including identification of suitable relocation site and would relocate the species into suitable habitat away from the construction footprint. • Fauna spotter-catcher will keep an inventory of any fauna species encountered with details of	• Reduce the construction footprint in forested areas. • Locate where possible temporary and permanent infrastructure outside of forested areas within the construction footprint. • Ensure that construction work areas do not afford habitat value to fauna (i.e. open roof cavities, material stockpiles). Entrances to any such areas should be barricaded to exclude entry/habitation by fauna. • Weed and pest management. • Management of waste to discourage fauna and prevent from approaching the construction site in search of food.	• Rehabilitate cleared areas no longer required to provide fauna habitat for a diversity of species as soon as possible after works are finished in the area. • Monitoring of relocated habitat (i.e. hollow logs) for use by Echidnas. • Monitoring of fauna underpasses for use by Echidnas.

Name	Potential Impacts	Management Actions			
		Prior to clearing	**During clearing**	**During construction**	**During operations**
		• Where possible avoid tampering with breeding places (i.e. nursery burrows) by allowing the breeding cycle to complete i.e. buffer zones in place until young has vacated the burrow. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Note juveniles leave the nursery burrow at around 8 months of age (Menkhorst & Knight 2011), so where an active breeding place is unable to be avoided, the young would be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Where an inactive breeding place is found, a licensed fauna spotter-catcher to remove and relocate inactive breeding structure where feasible into adjacent habitat and place at a similar height.	species, capture and release condition and capture and release GPS co-ordinates (**Appendix D**).		
Microchiropteran Bats: • Beccari's Freetail Bat	• Clearing of vegetation and habitat • Increased	• In the non-breeding season prior to clearing activities, pre-clearing survey of habitat will be undertaken by a suitably qualified and experienced bat	• Scheduling of clearing activities to be timed to avoid the main late winter to early summer breeding season of microbats.	• Ensure that construction work areas do not afford habitat value to microbats (i.e. open roof cavities, material stockpiles). Entrances to any such areas should be	• Installation of nest boxes for hollow-roosting microbats in accordance with nest box management plan.

Name	Potential Impacts	Management Actions			
		Prior to clearing	During clearing	During construction	During operations
• Chocolate Wattled Bat • Eastern Cave Bat • Gould's Wattled Bat • Inland Broad-nosed Bat • Inland Forest Bat • Little Broad-nosed Bat / Northern Broad-nosed Bat • Long-eared Bat • Northern Freetail Bat • White-striped Freetail Bat • Yellow-bellied Sheathtail-bat	anthropogenic activity leading to disturbance • Introduction of weeds and pest animals	ecologist to search for inactive breeding places of microbats including inspection of tree hollows and existing culverts, bridges and buildings for roosting microbats. Where possible, inactive breeding places (i.e. hollow) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows, culverts) left in situ will be barricaded to avoid re-colonisation by fauna before the clearing commences. • 24 hours prior to clearing activities a pre-clearing survey of habitat will be undertaken by a licensed spotter-catcher to check for presence of microbats and roosts. Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Outside of breeding season (i.e. late summer to early winter), if individuals are	• Clearing will be carried out in a sequential manner and in a way that directs escaping wildlife away from clearing and into adjacent native vegetation or habitat. • All clearing will be conducted in such a way that will prevent the isolation of habitat or habitat features. • Licensed, vaccinated and experienced bat spotter-catcher will be present during any vegetation clearing and removal of existing culverts, bridges and buildings. Should any bats be encountered during the felling operations, all works and activity must cease immediately and the bat spotter-catcher should catch and store the bats in calico bags and either release during dusk the same day if they are believe this is safe for the bats, or otherwise given to a wildlife carer. • Fauna spotter-catcher will keep an inventory of any fauna species encountered with details of species, capture and release condition and capture and release GPS co-ordinates (**Appendix D**).	barricaded to exclude entry/habitation by fauna.	• Rehabilitate cleared areas no longer required to provide fauna habitat for a diversity of species as soon as possible after works are finished in the area. • Monitoring of relocated roosts (i.e. hollows) and nest boxes for use by microbats.

Name	Potential Impacts	Management Actions			
		Prior to clearing	During clearing	During construction	During operations
		found, they can be removed by a licensed and experienced bat spotter-catcher and stored in calico bags until they can be released during dusk the same day. • If a roost is identified where possible avoid tampering with the breeding place and allow the breeding cycle to complete. A licensed, vaccinated and experienced bat spotter-catcher will utilise flagging tape and/or barricading to designate a sufficient buffer zone around the tree and the buffer zone will remain in place until the roost has vacated the hollow. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • If clearing of the roost is unavoidable, then the soft-felling technique would be utilised for the relocation of the roost feature. This involves inspection of the tree by an arborist, felling of the tree in sections and carefully lowering the limbs to the ground. Cuts			

Name	Potential Impacts	Management Actions			
		Prior to clearing	During clearing	During construction	During operations
		should be made at least 50 cm from the roost feature. The felled limb with the roost feature should be relocated into adjacent habitat at a similar height. • The bat spotter-catcher should be present during the felling operations. Should any bats be encountered during the felling operations, all works and activity must cease immediately and the bat spotter-catcher should catch and store the bats in calico bags and either released during dusk the same day if they are believe this is safe for the bats, or otherwise given to a wildlife carer. • Where an inactive breeding place is found, a licensed fauna spotter-catcher to remove and relocate inactive breeding structure where feasible into adjacent habitat and place at a similar height. • Develop a nest box management plan for hollow-roosting microbats to compensate removal of hollow-bearing trees or			

Name	Potential Impacts	Management Actions			
		Prior to clearing	During clearing	During construction	During operations
		existing culverts, bridges and buildings.			

4.3 Responsibilities

Adani is responsible to oversee the implementation of this SMP, including that all contractors engaged by Adani for construction and operation of the Project (Rail) comply with the conditions in this SMP.

The construction contractor engaged by Adani for construction of the Project (Rail) will be responsible for implementation of the management actions outlined in this SMP, including engagement of a qualified ecologist and licensed fauna spotter-catcher.

4.4 Qualified persons

All pre-clearing surveys will be undertaken by a suitably qualified, experienced ecologist or licensed fauna spotter-catcher (an ecologist may need to be engaged if the spotter-catcher does not have adequate fauna survey experience). All fauna relocation will be undertaken by a licensed fauna spotter-catcher (i.e. holding a Rehabilitation Permit issued by DEHP). In the event that an animal is injured and requires care, it will be taken by a licensed wildlife carer.

4.5 Contingency planning

Should other special least concern animals or colonial breeders (other than those identified in this SMP) be identified during pre-clearing surveys or clearing activities, all works should cease and DEHP should be notified immediately. Contingency measures (including any additional species management actions) will be determined in consultation with DEHP and implemented before construction is allowed to recommence.

In the event of injuries or death to species covered in this SMP during construction works or where there is collateral vegetation disturbance adjacent to the designated clearing area, construction work should stop in the area. Contingency measures will be determined in consultation with DEHP and implemented before construction is allowed to recommence.

5. Monitoring

5.1 Establishing pre-clearing condition

Pre-clearing surveys will be undertaken prior to the commencement of construction within potential habitat located within the construction footprint by a suitably qualified ecologist to confirm presence and inform fauna rehabilitation protocols. Where relevant, survey methodology will be based on relevant Survey Guidelines for Australia's Threatened Birds (DSEWPaC 2011) and/or Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (2012).

5.2 During clearing

All clearing will be supervised by a licensed fauna spotter-catcher. Immediately prior to the commencement of clearing activities, trees and habitat features will be thoroughly checked by the spotter-catcher. Salvageable habitat features (i.e. hollows and log piles) will be relocated into adjacent habitat. The spotter-catcher will also facilitate the safe relocation of any fauna found into pre-determined suitable relocation sites. The spotter-catcher will record details of fauna or habitat features that have been relocated (i.e. GPS location, species or habitat relocated, description of relocation site).

It is recommended that an independent audit during construction is undertaken by a third party to demonstrate compliance with the mitigation and management measures proposed (i.e. pre-clearing surveys, fauna spotter-catcher present).

5.3 Post-clearing monitoring

A monitoring program will be developed and implemented to assess the success of the mitigation and management measures proposed in this SMP. The monitoring program will include:

- Monitoring of habitat features (i.e. hollows, logs) that have been relocated into adjacent habitat or artificial habitat (i.e. nest boxes, artificial water sources) that have been installed into adjacent habitat to compensate loss of habitat. Monitoring will be required to determine the usage of relocated/artificial habitat, such as nest boxes by the target species and any maintenance requirements. Methods will involve a visual inspection of each habitat feature to collect data on fauna species occupancy (presence or signs), presence of pest species (i.e. European Bees, Common Myna, Termites), any deterioration of the habitat feature, maintenance required and whether the surrounding landscape has changed. Monitoring should be undertaken 12 months after the installation period followed by a summer or winter census to account for seasonal variation in the use of the nest boxes. It is proposed that annual monitoring and maintenance be undertaken thereafter for a duration of three years.
- Monitoring of fauna underpasses to assess use by fauna species. Monitoring methods will be standardised and targeted to the likely fauna species that will utilise the fauna crossing structures. Methods will likely include motion-detecting cameras with infrared flash installed, sand plots, and scat, track and scratch searches. Monitoring will commence six months after installation of fauna underpasses (i.e. Veage and Jones 2007) and will be undertaken annually to coincide periods that are likely to represent peaks in fauna movement and thus higher detection rates (i.e. spring), for a duration of three years to monitor the effectiveness of the fauna underpasses.
- Monitoring of rehabilitation areas to assess success against rehabilitation criteria using the BioCondition assessment methodology (Eyre et al., 2011). A Project Land Rehabilitation Plan will be prepared for rehabilitation including rehabilitation methods, key performance criteria and monitoring requirements. Monitoring should commence 1-2 years after establishment. It is proposed that annual monitoring and maintenance be undertaken thereafter for a duration of five years.

6. Reporting

A full report of the management actions undertaken in accordance with this SMP will be provided to DEHP/QPWS on completion of the Project (Rail) construction. This report will detail the number, type and location of breeding structures (i.e. nests or hollows) removed and any fauna species that were relocated, injured or killed during works. It will also detail the location of relocated fauna species and breeding structures. Reporting will be undertaken by the licensed fauna spotter-catcher or suitably qualified ecologist whilst on site during pre-clearing surveys and clearing works.

After completion of the post-clearing monitoring, a report will be provided to DEHP/QPWS detailing the condition and fauna use of any relocated breeding structures. Reporting will be undertaken by a suitably qualified ecologist engaged for the post-clearing monitoring.

Incidents involving wildlife injury or death will be recorded in DEHP's Fauna Incident Register (refer to **Appendix D**). The completed Fauna Incident Register must be forwarded via email to DEHP within 24 hours of the incident occurring. Contact details for DEHP are located in **Section 7.2**.

7. Miscellaneous

7.1 Definitions/Glossary

Agents – includes contractors and sub-contractors.

Animal breeding place – a bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring.

Colonial breeders – a group of animals of the same kind co-existing in close association for breeding purposes.

Licensed wildlife carer – a person qualified to take and keep protected wildlife under a current rehabilitation permit in accordance with the Nature Conservation (Administration) Regulation 2006.

Protected wildlife– native wildlife prescribed under the *Nature Conservation Act 1992 as* –

a) Extinct in the wild wildlife; or

b) Endangered wildlife; or

c) Vulnerable wildlife; or

d) Near threatened wildlife; or

e) Least concern wildlife.

Spotter catcher – a person qualified to take and keep protected wildlife under a current rehabilitation permit extended to authorise the take, keep or use of animal whose habitat is about to be destroyed by human activity in accordance with the *Nature Conservation (Administration) Regulation 2006.*

Suitably qualified and *experienced* – a person with a formal qualification and/or experience in ecological assessment, fauna identification and environmental management.

Tamper – Tamper with an animal breeding place, means damage, destroy, mark, move or dig up the breeding place.

7.2 Contact details

7.2.1 Adani

Hamish Manzi

General Manager Environment and Sustainability

Adani Mining Pty Ltd

Level 30, 10 Eagle Street, Brisbane, QLD 4000

GPO Box 2569, Brisbane, QLD, 4001

Phone: (07) 3223 4800

Email: hamish.manzi@adani.com

7.2.2 DEHP

TBC

7.2.3 Licensed fauna spotter-catcher

Fauna spotter-catchers will be employed by the construction contractor and will be DEHP licensed (i.e. Rehabilitation Permit).

7.2.4 Wildlife carers

Central Highlands and Coal Fields Wildlife Care and Rescue

2 Spoonbill Road, Clermont

Phone: (07) 4983 1415

For advice on microbat rehabilitation:

Australian Bat Clinic and Wildlife Trauma Centre (24 hr)

Trish Wimberley

Phone: (07) 5563 0333

Mobile: 0418 402 305

7.2.5 Veterinarian

Clermont Veterinary Surgery

29 Laglan Road, Clermont

Phone: (07) 4983 1172

Moranbah Veterinary Clinic

33 Mills Road, Moranbah

Phone: (07) 4941 7001

8. References

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Appendix A. Generic SMP

Species management program for tampering with animal breeding places

under

Section 88 of the *Nature Conservation Act 1992 and*
Section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*

November 2010

CONTENTS

1. SCOPE OF THE SPECIES MANAGEMENT PROGRAM

DERM accepts this document to be an approved species management program (SMP) for least concern wildlife, with the exception of some specified least concern species, for the purposes of section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006* (Wildlife Management Regulation).

This document provides a working arrangement for activities that may require the tampering with animal breeding places in a way that meets the legislative requirements of the *Nature Conservation Act 1992* (NCA).

Animal species prescribed as 'extinct in the wild', 'endangered', 'vulnerable', 'rare' or 'near threatened' under the Wildlife Regulation are not subject to this Species Management Program.

The species management program does not apply within a Forest Reserve or Protected Area prescribed under the NCA.

The species management program does not obviate the operation of any other legislation.

This SMP may only be applied by an entity that has obtained written approval from DERM to operate under this SMP (the approved entity).

2. TERMS OF THE SPECIES MANAGEMENT PROGRAM

2.1 This authority does not prevent any reasonable action being taken to safeguard public and staff safety in an emergency situation. In an emergency situation, public and staff safety considerations will take precedence. Where possible, the approved entity will discuss options with DERM on a case-by-case basis by contacting the relevant Regional Team Leader Wildlife (DERM). The approved entity will notify in writing (via email) the relevant Regional Team Leader Wildlife (DERM) of actions taken under this clause within 48 hours.

2.2 The Chief Executive's approval of this SMP is valid and in effect until 30 June 2013, and thereafter expires. A review of the effectiveness and impact of the SMP will be undertaken by DERM before the expiry date.

2.3 The species management program is granted subject to compliance with the conditions provided in this document, and approval may be revoked by DERM at any time according to the following process:

a) DERM gives notices to the approved entity that the conditions of this document have not been complied with by the approved entity; and
b) the approved entity fails to rectify the breach within the time period specified by DERM, being at least 15 business days.

2.4 If tampering with an animal breeding place occurs in contravention of any conditions of the species management program, such taking or tampering is not approved.

3. UNDERTAKINGS BY THE APPROVED ENTITY

The approved entity must:

3.1 Abide by the species management program conditions provided in this document to ensure protected wildlife and their respective breeding places are appropriately managed.

3.2 The approved entity must seek to achieve procedural uniformity across its organisation in terms of understanding and implementation of the species management program across its operations.

3.3 The approved entity must commit to incorporating the species management program into contract specifications.

3.4 The approved entity will use its discretion to consult with DERM where it identifies breeding places of species that might have heightened community interest.

4. CONDITIONS OF SPECIES MANAGEMENT PROGRAM

4.1 The species management program is subject to compliance with the conditions stated in this document.

4.2 The approved entity must maintain a register of tampering with animal breeding places (the register). For projects where the species management program applies, the register must record the number of obvious animal breeding places destroyed. Where the species management program does not apply, DERM's authority is required for tampering with breeding places of species.

4.3 The register must be made available to DERM upon request.

4.4 In relation to all new construction and maintenance activities undertaken in accordance with the species management program, the approved entity must minimise impacts on fauna by:

a) Inspecting trenches, culverts and other structures prior to works within an area to determine whether there are any trapped or injured native fauna species present and taking action as appropriate.

b) Where temporary fencing is required, giving consideration to fauna movement, current land uses and worker safety requirements.

c) Considering mechanisms to facilitate fauna movement through construction projects.

d) Educating staff, including contractors, in relation to the risks of fauna injury and deaths and how to manage animals which are injured or displaced, including threatened species.

4.5 Subject to 2.1, separate authority is required from DERM for interfering with breeding places for animals that are:

i. *special least concern animals* (as listed in the *Nature Conservation (Wildlife) Regulation 2006)*; or
ii. least concern (as listed in the *Nature Conservation (Wildlife) Regulation 2006)*, and are *colonial breeders*, and therefore whose broader populations are at greater risk from the impacts of events at a single location.

4.6 Where there is a likely presence of a breeding place of species listed in section 4.5, a suitably qualified and experienced person must be employed by the approved entity to undertake the field work required to identify potential, likely and known animal breeding places and separate authority obtained from DERM where necessary.

4.7 Disturbance of flying fox (grey-headed, spectacled, little red or black) camps (breeding places) is dealt with specifically in the NCA (s88C) and the Wildlife Management Regulation (s 181, 182 and 187A). This species management program does not authorise disturbance of flying fox breeding places. DERM must be contacted directly for any activity that may disturb such places.

4.8 For construction projects, the approved entity must:

a. Undertake a prior environmental assessment regarding animal breeding places. Where appropriate, this shall include on-ground ecological assessments, in addition to desk-top analysis. On-ground ecological assessment must be conducted by a suitably qualified and experienced person.

b. Consider the value of permanent and temporary water sources as possible breeding habitat for aquatic protected wildlife including platypus, turtles, frogs and fish, and where appropriate and practically safe, undertake an assessment of these values in view of impacts and mitigation strategies.

4.9 For maintenance activities an environmental assessment is not required. However where likely or new animal breeding places are identified the approved entity will comply with the actions identified within Table 1 and details of the breeding place/s will be recorded in the register.

Table 1. Authorised species management actions with respect to animal breeding places

Species group	Breeding place status	Action
Least concern – special least concern or colonial breeding	All	Consult with DERM. Specific authority to take[#] is required (damage mitigation permit or approved species management program).
Other least concern species	Contains young or eggs	Avoid unnecessary disturbance. Breeding place may be removed and eggs/young handed over to a licensed wildlife carer/facility. It is preferable to allow eggs to hatch and/or young to mature and move away from a breeding place. As a last resort, eggs may be destroyed°.
Other least concern species	No eggs or young	Proceed with caution. Remove breeding place if applicable.

Table Notes:

[#] Where the removal or translocation of wildlife is required, the 'take' must be facilitated by a suitably licensed and experienced person.

° There are two acceptable methods for destroying or terminating eggs: quickly breaking an egg and crushing its contents; or reducing the temperature of the egg to less than 4 degrees C for at least 4 hours.

4.10 The following species management practices will be considered and, where practicable, will be applied to all activities independently or in combination to minimise disturbance to breeding animals and/or their young (higher order options are preferred):

a. Option 1: Avoid the need for tampering through concept phase assessment of animal breeding places and sympathetic consideration in planning and design (including route location)
b. Option 2: Avoid the need for tampering through operation timing (avoiding breeding seasons to allow young to mature and leave breeding places, delaying operations if breeding identified)
c. Option 3: Remove or relocate a breeding place without eggs or young (conditions apply- see Table 1)
d. Option 4: Remove or relocate a breeding place and place eggs/young with a wildlife carer/facility (conditions apply – see Table 1)
e. Option 5: Remove or relocate a breeding place and destroy/terminate eggs (conditions apply – see Table 1).

4.11 Where the tampering with a known breeding place of a least concern species other than the species listed in 4.5 would also *take* protected wildlife, the approved entity must attempt to enlist the assistance of a licensed spotter-catcher and/or wildlife carer/facility.

4.12 If it can be shown that the engagement of a spotter catcher was not practical and/or safe to do so, then a suitably qualified and experienced person must be engaged to

facilitate any taking of wildlife for rehabilitation purposes and Table 1 must be complied with.

4.13 Where the destruction of a breeding structure will impact on the future breeding success of an animal (for instance, a breeding season will be foregone while a large nest is reconstructed, or no or limited potential breeding structures exist in the vicinity), and where a suitably qualified and experienced person deems it appropriate, the approved entity must provide the necessary support to allow for the relocation of the breeding structure.

4.14 Removal and relocation of breeding structures must be undertaken by suitably qualified and experienced persons and advice sought where necessary.

4.15 Large mature trees must be retained to provide wildlife habitat unless their removal is warranted for safety or maintenance reasons. Trees, particularly *Eucalypt* and *Corymbia* species, often have hollows that are valuable habitat for glider, bird and bat species.

4.16 The decision to rehabilitate an animal must consider the ability for it to be successfully released and availability of appropriate natural habitat within the vicinity of where the animal was found. Where the removal of eggs/animals is required, the approved entity must engage a suitably qualified and licensed wildlife carer/facility to incubate all eggs removed and to raise young animals,

5. RECITALS

5.1 Under the *Nature Conservation Act 1992* section 88 – a person must not take, keep or use a protected animal other than under some form of authorisation, such as a licence or permit or under a conservation plan. A defence to taking is provided by the Act where

(a) the taking happened in the course of a lawful activity that was not directed towards the taking; and
(b) the taking could not have been reasonably avoided.

5.2 *Nature Conservation (Wildlife Management) Regulation 2006* section 332 – Tampering with animal breeding place

(1) A person must not, without a reasonable excuse, tamper with an animal breeding place that is being used by a protected animal to incubate or rear the animal's offspring. Maximum penalty—165 penalty units.

(2) For subsection (1), an animal breeding place is being used by a protected animal to incubate or rear the animal's offspring if—
(a) the animal is preparing, or has prepared, the place for incubating or rearing the animal's offspring; or
(b) the animal is breeding, or is about to breed, and is physically occupying the place; or
(c) the animal and the animal's offspring are physically occupying the place, even if the occupation is only periodical; or
(d) the animal has used the place to incubate or rear the animal's offspring and is of a species generally known to return to the same place to incubate or rear offspring in each breeding season for the animal.

(3) It is a reasonable excuse for a person to tamper with the breeding place if—
(a) the tampering happened in the course of a lawful activity that was not directed towards the tampering; and
(b) the tampering could not have been reasonably avoided.

(4) Also, subsection (1) does not apply to a person removing or otherwise tampering with the breeding place if—
(a) the removal or tampering is part of an approved species management program for animals of the same species; or
(b) the person holds a damage mitigation permit for the animal and the permit authorises the removal or tampering.

6. DEFINITIONS

agents includes—
contractors and sub-contractors

animal breeding place means—
a bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring'.

for a koala – a *non-juvenile koala habitat tree* located within a *bushland habitat* that is known or likely to contain koalas (see the *Koala Conservation in South East Queensland State Planning Policy* for definitions)

approved species management program means—
For a species of animal, means a program about managing the population and habitat of the species of animal that is approved by the DERM chief executive.

colonial breeders means—
a group of animals of the same kind co-existing in close association for breeding purposes.

construction includes-
each of the following for the infrastructure, to the extent it involves the development of the infrastructure –

(a) initial construction (including field investigations, relocation of services and surveys);
(b) improvement of its standard;
(c) realignment;
(d) widening;
(e) extension to infrastructure or associated assets.

licensed wildlife carer means—
A person qualified to take and keep protected wildlife under a current rehabilitation permit in accordance with the *Nature Conservation (Administration) Regulation 2006.*

maintenance includes—
(a) rehabilitation; and
(b) replacement; and
(c) repair; and
(d) recurrent servicing; and
(e) preventative and remedial action; and
(f) removal; and
(g) alteration; and
(h) maintaining systems and services for transport infrastructure.

protected wildlife means—
native wildlife prescribed under the *Nature Conservation Act 1992* as—
(a) extinct in the wild wildlife; or
(b) endangered wildlife; or
(c) vulnerable wildlife; or
(d) rare wildlife; or
(e) near threatened wildlife; or
(f) least concern wildlife.

special least concern animal means the following—

(a) the koala (*Phascolarctos cinereus*);

(b) the echidna (*Tachyglossus aculeatus*);

(c) the platypus (*Ornithorhynchus anatinus*);

(d) a least concern bird to which any of the following apply—

(i) the agreement called 'Agreement Between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment' and signed at Tokyo on 6 February 1974;

(ii) the agreement called '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' and signed at Canberra on 20 October 1986;

(iii) the convention called 'Convention on the Conservation of Migratory Species of Wild Animals' and signed at Bonn on 23 June 1979.

suitably qualified and experienced means—

A person with formal qualifications and/or experience in fauna identification and life ecology and environmental management. A person is considered to be suitably qualified and experienced if they meet one or more of the following criteria:

- An ecological consultant with experience in conducting fauna surveys;
- A person who possesses a degree in natural science or similar with experience in conducting fauna surveys;
- A person who is a spotter-catcher under a rehabilitation permit issued under the *Nature Conservation Act 1992*;
- A person who can demonstrate significant experience in the removal of trees and spotting for wildlife to ensure they are not harmed during vegetation clearing.

spotter-catcher means—

A person qualified to take and keep protected wildlife under a current rehabilitation permit extended to authorise the take, keep or use of an animal whose habitat is about to be destroyed by human activity in accordance with the *Nature Conservation (Administration) Regulation 2006.*

tamper means—

Tamper with an animal breeding place, means damage, destroy, mark, move or dig up the breeding place.

take includes—

(a) in relation to an animal -

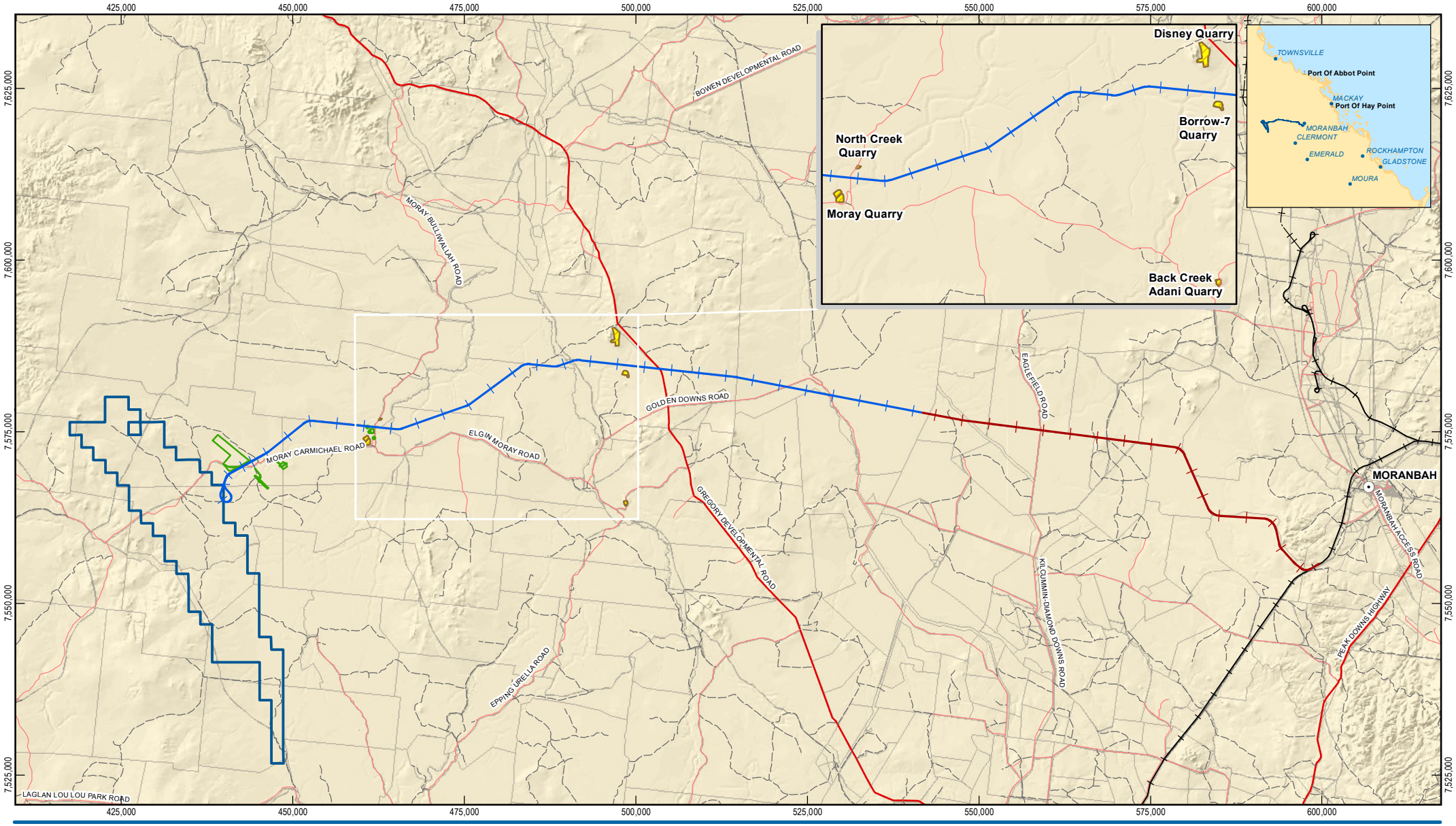
(i) hunt, shoot, wound, kill, skin, poison, net, snare, spear, trap, catch, dredge for, bring ashore or aboard a boat, pursue, lure, injure or harm the animal; or

(ii) attempt to do an act mentioned in subparagraph(i).

7. DERM CONTACTS (WILDLIFE RANGERS)

DERM	Office	Phone number
Northern region	Team Leader (Wildlife)	4796 7792
	Atherton	4091 1844
	Cairns	4047 9615
	Townsville	4796 7777
Central region	Team Leader (Wildlife)	4936 0529
	Airlie Beach	4967 7365
	Charleville	4654 4725
	Longreach	Contact Team Leader
	Mackay	4944 7817
	Rockhampton	4936 0525
	Roma	4624 3523
Southern region	Team Leader (Wildlife)	5520 9620
	Bundaberg	4151 9507
	Burleigh	5520 9600
	Daisy Hill	3290 9110
	Gympie	5480 5443
	Maroochydore	5459 6110
	Maryborough	4121 1800
	Moggill	3202 0296
	Toowoomba	4699 4333

Appendix B. Project (Rail) location



1:750,000 (at A4)

0 5 10 15 20 25

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Existing Railway
- State Road
- Local Road
- Track
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)
- Cadastral Parcel
- Quarry
- Mine Footprint

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Species Management Plan

Project Location

Job Number 41-26422
Revision B
Date 14-10-2013

G:\41\26422\GIS\Maps\MXD\0000_Overview\41_26422_0025_rev_b.mxd

Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DNRM: DEM (2008), DCDB (2010), Physical Road Network (2011); DME: EPC1690 (2010), EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Localities, Railways (2007); Adani: Footprint, Alignment, Offsite, Quarries (SP1&2)(2013). Created by: MS

Appendix C. Species profiles

C.1 Terrestrial Birds

C.1.1 Apostlebird (*Struthidea cinerea*)

Species Profile - Apostlebird (*Struthidea cinerea*)	
Description	Apostlebird is a highly social bird that congregates in flocks of 100+ in winter. This species has a grey body with pale streaks and brown wings. Birds walk on the ground foraging in groups and also preen and roost in rows on branches (Simpson & Day, 2004).
Habitat	This species is usually found near water in drier open forests, woodlands and scrub. Nests are a large mud bowl reinforced with grass attached to a horizontal branch at a height of 3-20 m (Pizzey & Knight, 1997; Simpson & Day, 2004).
Breeding	Apostlebirds breed from August to March in family packs of 8-14 individuals (Pizzey & Knight, 1997; Simpson & Day, 2004). This species is very communal in its breeding from building a communal nest to shared incubation of eggs laid by several females (Schodde & Tidemann, 1997).
Feeding	Apostlebirds eat vegetable matter, invertebrates and small vertebrates in summer; seeds, herbs and grasses become an important food source in winter. Apostlebirds forage on the ground in groups and often feed with poultry (Schodde & Tidemann, 1997; Simpson & Day, 2004).
Status	Least concern under the NC Act. Colonial breeder.
Distribution on Project (Rail) study area	Apostlebird was located in “open woodland fringing watercourses and on floodplains” and “*Acacia* woodland or forest” in the rail alignment. They were recorded in the September survey at rapid survey sites 1 and 2, and opportunistically throughout the study area. They were not observed on the quarries.

C.1.2 Fork-tailed Swift (*Apus pacifius*)

Species Profile - Fork-tailed Swift (*Apus pacifius*)	
Description	Fork-tailed Swift is a medium sized swift that grows to 18-21 cm in length and weighs between 30-40 grams. This bird is characterised by a long, deeply forked tail. The plumage of this species is similar for both sexes with the body, tail and upper wings are a black-brown, they have a faint scaling to the saddle and white scalloping on the under body (DSEWPaC, 2013).
Habitat	This species is almost exclusively aerial and are known to fly between 1 – 300 m above the ground (DSEWPaC, 2013).
Breeding	Fork-tailed Swift does not breed in Australia. They breed in Siberia between April to July (DSEWPaC, 2013).
Feeding	Fork-tailed Swifts forage and feed on insects while on the wings (DSEWPaC, 2013).
Status	Special least concern under NC Act. Migratory and marine under EPBC Act.
Distribution on Project (Rail) study area	No Fork-tailed Swifts were observed throughout the surveys however it is likely that this species will fly over the study area.

C.1.3 Grey-crowned Babbler (*Pomatostomus temporalis*)

Species Profile - Grey-crowned Babbler (*Pomatostomus temporalis*)	
Description	Grey-crowned Babbler is the largest Australian babbler and the only Australian babbler without a dark crown. This species has a long, down-curved black bill and a narrow grey crown above a dark brown eye-stripe. They have black/brown upperparts and either light brown or rufous underparts with a long black/brown tail with a white tip. Their throat and upper breast is white (Pizzey & Knight, 1997; Simpson & Day, 2004). Grey-crowned Babbler's are long lived birds (Schodde & Tidemann, 1997).
Habitat	This species is usually found in dry, open forest and scrubby woodlands, trees bordering roads and farmland with isolated trees (Simpson & Day, 2004).
Breeding	This species usually lives and breeds in a communal group of 12+ individuals. Breeding pairs mate for life and are often the only breeding birds within the group. This species begins breeding around the first rain events of spring and the female of the breeding pair incubates and broods the chicks while being fed by the other birds. On occasion, a group will contain more than one breeding pair. In these cases, the breeding pairs share the same nest (Schodde & Tidemann, 1997).
Feeding	Groups forage predominantly on the ground but also on live or dead trees (preferring those with rough bark) and in shrubs. They eat invertebrates and small vertebrates such as lizards (Schodde & Tidemann, 1997).
Status	Least concern under the NC Act. Colonial breeder.
Distribution on Project (Rail) study area	Grey-crowned Babbler was located in "*Acacia* woodland or forest, open woodland fringing watercourses" and on "floodplains and in non-remnant vegetation" in the rail alignment. They were recorded in the September survey at rapid survey sites 2, 3, 5 and 8, and opportunistically along the rail alignment.

C.1.4 Fairy Martin (*Petrochelidon ariel*)

Species Profile - Fairy Martin (*Petrochelidon ariel*)	
Description	Fairy Martin is a small swallow with a white rump and short, slightly forked tail that looks square in flight. This species has a short, black bill, ginger crown, pale cheeks and white underparts. Flies with quick, clipped wingbeats and glides. Often in mixed flocks with Tree Martins (Pizzey & Knight, 1997).
Habitat	This species is usually found in open country with large trees, especially in areas near watercourses (Pizzey & Knight, 1997).
Breeding	Fairy Martin breeds from July to January and is the only Australian bird to build a mud-bottle nest. These nests have a drooping, narrow entrance-spout. Fairy Martins form colonies of few to dozens whose nests are often fused together on walls, ceilings of caves, overhung banks, road culverts. Nests are often reused by Tree Martins and microbats, among other species (Pizzey & Knight 1997).
Feeding	This species is an aerial forager that hunts small invertebrates through open woodlands, above paddocks and also through swarms above water. Fairy Martin will also dive to eat insects from the water surface (Schodde & Tidemann 1997).

Species Profile - Fairy Martin (*Petrochelidon ariel*)	
Status	Least concern under the NC Act. Colonial breeder.
Distribution on Project (Rail) study area	Located on the quarry sites.

C.1.5 Rainbow Bee-eater (*Merops ornatus*)

Species Profile - Rainbow Bee-eater (*Merops ornatus*)	
Description	Rainbow Bee-eater is a brightly coloured, communal bird. Their general colouring is bright green, blue and rufous with red eyes and a black bill. The underside of their wings are rufous coloured; their tails are black with extended, thin central feathers (Pizzey & Knight, 1997; Simpson & Day, 2004).
Habitat	This species is usually found in open woodlands with sandy, loamy soil. They are also found around mangroves, cliffs and rainforests (Pizzey & Knight, 1997).
Breeding	Rainbow Bee-eater breeds in pairs, in loose colonies, with helpers. They nest in tunnels dug in sandy banks. These tunnels can be upwards of 1 m long with a circumference just larger than the birds' body. The young are brooded and fed by the parents and helpers and fledge four to six weeks after hatching. Sociality peaks during the breeding season and Rainbow Bee-eaters nest together with 30-40+ other birds and share the tasks of incubating and caring for the young (Pizzey & Knight, 1997; Schodde & Tidemann, 1997).
Feeding	Rainbow Bee-eater hunts insect prey and captures them on the wing. They generally hunt venomous bees and wasps, among other flying insects. After catching the insect, Rainbow Bee-eater flied back to a perch where it squeezes out any sting before ingesting it (Schodde & Tidemann, 1997).
Status	Special least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	Rainbow Bee-eater was located in "*Acacia* woodland or forest" in the rail alignment. They were observed in September survey at rapid survey site 4 and opportunistically through the rail alignment. They were also observed on several of the quarries and potential nesting burrows were observed North Creek Pit.

C.1.6 Satin Flycatcher (*Myiagra cyanoleuca*)

Species Profile - Satin Flycatcher (*Myiagra cyanoleuca*)	
Description	Satin Flycatcher is sexually dimorphic; the male is glossy blue-black to the mid-chest with white underparts whereas the female has a slightly glossy blue-black head and wings/back with a rich orange throat/upperbreast and white underparts (Pizzey & Knight, 1997).
Habitat	Satin Flycatcher is usually found in heavily vegetated gullies of forests, woodlands, mangroves and gardens (Pizzey & Knight, 1997).
Breeding	This species breeds from October to February. Their nests form a neat cup made from bark, moss, spider web, etc. Their nests are usually placed on a fork of a dead, or near dead, branch. Satin Flycatchers usually nest in loose colonies of 2-5 pairs (Pizzey & Knight, 1997; Schodde & Tidemann, 1997).

Species Profile - Satin Flycatcher (*Myiagra cyanoleuca*)	
Feeding	Satin Flycatcher usually feeds in the upper strata of the forest on a wide range of insect groups which are captured on the wing (Schodde & Tidemann, 1997).
Status	Special least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	Likely to occur, previously recorded at the mine site.

C.1.7 Tree Martin (*Petrochelidon nigricans*)

Species Profile - Tree Martin (*Petrochelidon nigricans*)	
Description	Tree Martin is a small swallow with an off-white rump and short, slightly forked tail that looks square in flight. This species has a short, black bill, rufous front and a glossy blue crown, mantle and lower back with brown wings and tail feathers. Their chin, breast and flanks are cream and lightly striated (Pizzey & Knight, 1997; Simpson & Day, 2004).
Habitat	This species is usually found in open country with large trees, especially in areas near watercourses. This bird predominantly inhabits large eucalypt trees that offer roosting and nesting hollows (Pizzey & Knight, 1997; Schodde & Tidemann, 1997).
Breeding	Tree Martin breeds from July to August and builds a loose-grass nest, partially walled off by mud, in tree hollows. They occasionally nest in holes in cliffs, buildings or abandoned Fairy Martin nests (Pizzey & Knight, 1997). They often nest communally in neighbouring trees and occasionally a single hollow may contain several nests; large groups of this species are often observed diving into tree hollows one-by-one at dusk. Tree Martin nests are reused annually (Schodde & Tidemann, 1997).
Feeding	This species is an aerial forager that hunts invertebrates; usually above the trees but also on swarms above water. The Tree Martin will also dive to eat insects from the water surface (Schodde & Tidemann, 1997).
Status	Least concern under the NC Act. Marine under the EPBC Act. Semi-colonial breeder.
Distribution on Project (Rail) study area	This species was recorded as an opportunistic observation during the May survey of the rail alignment.

C.1.8 White-bellied Sea-Eagle (*Haliaeetus leucogaster*)

Species Profile - White-bellied Sea-Eagle (*Haliaeetus leucogaster*)	
Description	White-bellied Sea-eagle is a large raptor that has unfeathered, cream legs and feet. This bird has long, broad wings and a short wedge-shaped tail. The plumage of adult birds is predominantly white and grey. The back and upper surfaces of the wings are black/grey with black tips and the head, breast and belly are white (Pizzey & Knight, 1997).
Habitat	White-bellied Sea-Eagle is usually found near waterbodies such as coastlines, estuaries, rivers, lakes and reservoirs and on islands (Pizzey & Knight, 1997).
Breeding	This species breeds from May to October. At the onset of breeding, birds display a flight display that includes looping movements. Both sexes build large nests structures that are up to 4 m deep and 30 m+ from the ground. The female does most of the incubating and brooding but the male relieves from time-to-time. The eggs are incubated for about six weeks with young fledging in 9-10 weeks (Schodde & Tidemann, 1997).
Feeding	White-bellied Sea-Eagle primarily hunts for prey in waterbodies, commonly diving on fish, tortoises, sea-snakes, waterfowl, etc. They also hunt on land for animals such as rabbits. Carrion is also consumed at times (Schodde & Tidemann, 1997).
Status	Special least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	Likely to occur.

C.1.9 White-throated Needletail (*Hirundapus caudacutus*)

Species Profile - White-throated Needletail (*Hirundapus caudacutus*)	
Description	White-throated Needletail is a large swift and one of the world's fastest birds. Their bodies are dark with a white throat, vent and flanks. Their short, dark, square tails have small, extended, needle-like shafts which help them cling to vertical surfaces. This species sometimes glides in groups (Pizzey & Knight, 1997; Schodde & Tidemann, 1997).
Habitat	White-throated Needletail is often seen flying over forests, woodlands, farmlands, coasts, towns, lakes, etc. Feeding companies often patrol hilltops and forested ranges (Pizzey & Knight, 1997).
Breeding	This species breeds in the Northern Hemisphere in May to August and migrates to the east coast of Australia in the summer, arriving in mid-October and departing again in mid-April. In their Northern Hemisphere breeding grounds, these birds display aerial courtship displays of chasing each other, diving and swooping. White-throated Needletail nests in the hollows of trees (Pizzey & Knight, 1997; Schodde & Tidemann, 1997).
Feeding	This species feeds and drinks only while flying. They feed on insects, sometimes brushing them from plants while in flight, and drink by skimming over the surface of waterbodies (Schodde & Tidemann, 1997).
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	Recorded as an opportunistic observation in the surrounding area to the quarries and it is likely that this species will be a fly-over species to the quarries.

C.2 Wetland Birds

C.2.1 Black-tailed Godwit (*Limosa limosa*)

Species Profile - Black-tailed Godwit (*Limosa limosa*)	
Description	Black-tailed Godwit is large wader bird that grows to a length of 40-44cm. They are described as graceful, large bird with a small head, long neck with a very ling straight slightly curved bill and long legs. The females of this species are slightly larger and have longer bills (DSEWPaC, 2013a)
Habitat	Typically this species is commonly seen in coastal environments such as tidal flats and estuaries, however there are some records from inland where they occur in freshwater lakes, farm dams and bore-overflows (DSEWPaC, 2013a)
Breeding	Black-tailed Godwit does not breed in Australia, they breed in the northern hemisphere from April to mid-June (DSEWPaC, 2013a)
Feeding	Black-tailed Godwit is omnivorous and will feed on a variety of aquatic fauna such as crustaceans and tadpoles, they also occasionally feed on seed (DSEWPaC, 2013a).
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Black-tailed Godwits were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources.

C.2.2 Caspian Tern (*Hydroprogne caspia*)

Species Profile - Caspian Tern (*Hydroprogne caspia*)	
Description	Caspian Tern is the largest tern in Australia growing to 53-60 cm with an average weight of 680 grams. They have long, slender backswept wings with a slightly forked tail. Their heavy bill is red with a dusky tip. Both sexes of the Caspian Tern look very similar with no distinguishing traits (DSEWPaC, 2013b)
Habitat	Common seen near sheltered coast lines in areas such as lagoons, bays or harbours. They have been recorded inland near wetlands and artificial water sources such as dams (DSEWPaC, 2013b).
Breeding	Caspian Terns that breed in Australia have no set breeding season with the timing varying throughout the different states. Their nest usually consists of a scrape on the ground in which they typically lay a clutch of 1-3 eggs (DSEWPaC, 2013b)
Feeding	Caspian Tern's diet consists largely of fish with crayfish and worms also known to be eaten. They typical forage from early to mid-morning by flying 3-15 m above the water's surface (DSEWPaC, 2013b)
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Caspian Terns were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources.

C.2.3 Common Greenshank (*Tringa nebularia*)

Species Profile - Common Greenshank (*Tringa nebularia*)	
Description	Common Greenshank is described as a heavy built, elegant wader that grows to 30-35 cm and weighs 190 grams with both sexes looking similar. Their bill is long and slightly upturned and they have long, yellowish-green legs. Their plumage is uniformly dark upper wing, with a white rump extending to the white wedge up the back (DSEWPaC, 2013c).
Habitat	They are seen in a wide variety of inland wetlands and sheltered coastal habitats, they are known to occur near artificial water sources (DSEWPaC, 2013c)
Breeding	Common Greenshank breeds from late April to June. They nest on the ground in open usually near dead logs or large rocks (DSEWPaC, 2013c)
Feeding	Common Greenshank is carnivorous and is known to feed on a range of crustaceans and molluscs. they are known to feed during the day and night (DSEWPaC, 2013c)
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Common Greenshanks were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources.

C.2.4 Common Sandpiper (*Actitis hypoleucos*)

Species Profile - Common Sandpiper (*Actitis hypoleucos*)	
Description	Common Sandpiper is a small sandpiper growing to 19-21 cm. The breeding plumage of this species is dark brown above with greenish feathers of cap, hind neck and mantle. The brown colouring is irregularly barred and they have white under feathers. This species has a prominent white eye-ring and indistinct dark eye-stripe from the bill to the rear of ear opens (DSEWPaC, 2013d)
Habitat	This species is known to occur in a wide variety of coastal wetlands and some inland wetlands (DSEWPaC, 2013d).
Breeding	Common Sandpiper does not breed in Australia. They breed in Europe and Asia during the April to August period (DSEWPaC, 2013d).
Feeding	Common Sandpipers are typically carnivorous and feed on a variety of aquatic life such as bivalves, crabs and insects (DSEWPaC, 2013d).
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Common Sandpipers were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources.

C.2.5 Curlew Sandpiper (*Calidris ferruginea*)

Species Profile - Curlew Sandpiper (*Calidris ferruginea*)	
Description	Curlew Sandpiper is a small, slim sandpiper growing to 18-23 cm in length and weighing 57 grams. They have long legs and neck with a long, black bill that is de-curved with a slender tip. They have a pale brownish-grey with dark streaks plumage on their cap, ear coverts, hind neck and side of neck. They have a white chin and throat and their under body is whitish grey and they upper body is a pale brownish-grey with dark streaks (DSEWPaC, 2013e).
Habitat	This species is commonly seen in intertidal flats along the coast line but have been observed in flooded paddocks and other inland water bodies (DSEWPaC, 2013e).
Breeding	Curlew Sandpiper does not breed in Australia. They breed in Siberia during June and July (DSEWPaC, 2013e)
Feeding	Curlew Sandpiper feeds mainly on invertebrates including worms and molluscs. They feed by probing sand and mud flats in shallow water (DSEWPaC, 2013e).
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Curlew Sandpipers were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources.

C.2.6 Glossy Ibis (*Plegadis falcinellus*)

Species Profile - Glossy Ibis (*Plegadis falcinellus*)	
Description	Glossy Ibis is dark red-brown when breeding with a green sheen on their wings. They have a ducky head that is streaked with white when the birds are not breeding. Their bills are olive brown and their legs, feet and eyes are brown (Schodde & Tidemann, 1997).
Habitat	This species is usually found in well vegetated wetlands and wet pastures and occasionally dry grasslands (Pizzey & Knight 1997).
Breeding	Glossy Ibis breeds from September to April. Their nests are shallow platforms of leafy sticks over water built in trees, shrubs, reeds, etc. Glossy Ibis often nests in colonies of 10-20 breeding pairs, often with other waterbirds. Of the several eggs laid, only one chick usually fledges. Generally, the first to hatch outcompetes with the others for food. Glossy Ibis bow to, and preen each other near their nests (Schodde & Tidemann, 1997).
Feeding	Glossy Ibis feed in small flocks of 2-30+ in shallow waterbodies, particularly where trees and other vegetation provides shelter. They probe the mud while wandering, searching for their prey of small vertebrates and invertebrates. They also peck small animals from plants (Schodde & Tidemann, 1997)
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	Found in a wetland near the quarry sites but no recorded directly on the rail alignment or quarry sites.

C.2.7 Great Egret (*Ardea modesta*)

Species Profile - Great Egret (*Ardea modesta*)	
Description	When in flight, the legs of Great Egret extend well beyond the tail. This species has white plumage and a yellow bill, green/yellow facial skin and dark grey/black legs (Pizzey & Knight, 1997; Simpson & Day, 2004). Great Egret is the largest of the white herons and is usually solitary (Schodde & Tidemann, 1997).
Habitat	This species is usually seen wading in the shallows of waterbodies such as rivers, mudflats and wetlands (Pizzey & Knight, 1997).
Breeding	On the east coast of Australia, Great Egret breeds from November to February. They nest on a platform of sticks in a tree up to 15 m above the ground, usually over water or in a reed bed. Both sexes incubate the eggs for around 25 days before hatching, after which chicks fledge in six weeks (Pizzey & Knight, 1997; Schodde & Tidemann, 1997).
Feeding	When hunting, Great Egrets employ a wait-and-watch strategy where they wait motionless for long periods of time before slowly stalking their prey. They generally feed on fish, however they also eat insects and crustaceans (Schodde & Tidemann, 1997).
Status	Special least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	This species was recorded opportunistically during the September survey of the rail alignment and was found in a wetland near the quarry sites but no recorded directly on the rail alignment or quarry sites.

C.2.8 Latham's Snipe (*Gallinago hardwickii*)

Species Profile - Latham's Snipe (*Gallinago hardwickii*)	
Description	Latham's Snipe is the largest snipe in Australia and growing to a length of 29-33 cm and weigh between 150-230 grams. They have a long straight bill with short board wings, a long tail and short legs. Their plumage is marked with barring and chevrons of buff, black and various shades of brown. They have blackish-brown strips across the crown and cream streak down their backs (DSEWPaC, 2013f).
Habitat	This species is usually found in permanent and ephemeral wetlands up to 2000 m above sea-level and will in habit open freshwater wetlands that have low, dense vegetation (DSEWPaC, 2013f).
Breeding	Latham's Snipe does not breed in Australia. The breeding grounds are confined to Japan and far eastern Russia (DSEWPaC, 2013f).
Feeding	Latham's Snipe is omnivorous and feeds on seeds and other plant material as well as invertebrates including insects. Their diet varies depending on their location in Australia (DSEWPaC, 2013f).
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Latham's Snipes were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources with low, dense vegetation.

C.2.9 Marsh Sandpiper (*Tringa stagnatilis*)

Species Profile - Marsh Sandpiper (*Tringa stagnatilis*)	
Description	Marsh Sandpiper is a medium sandpiper that grows to 22-26 cm in length and weighs 70 grams. Their plumage shows contrasting outer wing, a very pale whitish tail and a bold white wedge up the back (DSEWPaC, 2013g).
Habitat	This species is usually found in permanent or ephemeral wetlands of varying salinity, including swamps, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks (DSEWPaC, 2013g).
Breeding	Marsh Sandpiper does not breed in Australia. They breed in north-east Ukraine from late April to June (DSEWPaC, 2013g).
Feeding	Marsh Sandpiper is carnivorous and has been recorded to feed on insects, molluscs and crustaceans. They typically feed by wading in the shallows of a water body (DSEWPaC, 2013g).
Status	Least concern under the NC Act. Migratory and marine under the EPBC Act.
Distribution on Project (Rail) study area	No Marsh Sandpipers were observed throughout the surveys however it is likely that this species will occur near wetlands and artificial water sources.

C.3 Ground Mammals

C.3.1 Echidna (*Tachyglossus aculeatus*)

Species Profile - Echidna (*Tachyglossus aculeatus*)	
Description	Echidna is a robust ground-dwelling monotreme with strong, sharp spines covering the top of their head, back and tail. These spines are yellow with black points. They have a tubular, naked snout with a small mouth and nostrils at the tip. Echidna is a powerful digger with short legs and long claws (Queensland Museum 2007; Menkhorst & Knight 2011).
Habitat	Echidna is distributed throughout Australia in almost all terrestrial habitats excluding intensively managed farmland. Echidna is common anywhere with ground cover and ants (Queensland Museum, 2007; Menkhorst & Knight, 2011).
Breeding	The mating period odf the Echidna is from June to September and is the only time when they are found in groups. The female lays a single egg. After hatching, the juvenile is carried in a small pouch on the mother's belly for about 55 days or until spines develop. The mother then leaves the juvenile in a nest (burrow) and returns every 5-10 days to suckle it. The juvenile is weaned at around eight months old (Menkhorst & Knight, 2011).
Feeding	Echidna is toothless and feeds on ants, termites and other soil invertebrates such as beetle larvae. Echidna exposes its prey by digging through the soil and rotten wood, licking up insects with its tongue (Menkhorst & Knight, 2011).
Status	Special least concern under the NC Act.
Distribution on Project (Rail) study area	Evidence of Echidna was located in open woodland fringing watercourses and on floodplains near the centre of the rail alignment during the September survey at rapid survey site 5.

C.4 Mircochiropteran bats

Species Profile - Mircochiropteran bats	
Description	Microchiropteran bats (microbats), also known as the "insectivorous bats", belong to the suborder Microchiroptera. Most microbats are small with a wingspan of about 30 cm. They use echolocation to navigate and find food, primarily insects (Churchill, 2008).
Habitat	Microbats roost in many places including caves, branches, tree hollows, beneath bark, abandoned bird nests and in old buildings. These roosts provide daytime protection from predators and environmental extremes (Churchill, 2008). Specific habitats for each microbat species in this SMP are as follows (Churchill, 2008): • Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) – roosts in large tree hollows in mixed sex groups of 2-6, and sometimes up to 30, individuals. Occurs in almost all habitats including wet and dry sclerophyll forest, open woodland, *Acacia* shrubland and desert. Occasionally reported hanging from the outside of walls of buildings. • White-striped Freetail Bat (*Austronomus australis*) – a tree-dwelling bat that roosts either solitarily or in groups of up to 25; most commonly in the hollows of old eucalypt trees with multiple entrances. Have been observed sharing hollows with possums. Occurs in urban areas, forests, shrublands, grasslands and deserts. In summer, this species moves south to cooler areas. • Northern Freetail Bat (*Chaerephon jobensis*) – roosts in tree hollows in colonies of 10-15, but also found in caves and buildings in colonies of up to 300. Occurs in mangroves, monsoon

Species Profile - Mircochiropteran bats	
	forests, paperbark-lined creeks, open forest and woodlands and savannah. Frequently forage over agricultural areas. • Beccari's Freetail Bat (*Mormopterus beccarii*) – commonly roosts in tree hollows, caves and the roofs of houses. Colonies of up to 50 have been recorded. Occurs in rainforest, flood plains, open forest and woodlands, shrublands and grasslands. Frequently caught along watercourses. • Gould's Wattled Bat (*Chalinolobus gouldii*) – usually roosts in tree hollows; also buildings. Females form colonies of up to 40 in tree hollows and up to 80 in buildings; males are usually solitary. This species of microbat is found in virtually all habitats throughout Australia. • Inland Broad-nosed Bat (*Scotorepens balstoni*) – roosts in tree hollows in colonies of up to 45; also in the roofs of houses. Occurs throughout the arid and semi-arid regions of inland Australia. Common over water and along tree-lined waterways. • Little Broad-nosed Bat (*Scotorepens greyii*) – roosts in hollows; usually of trees but also old fence posts. They also roost in old buildings. Colonies of up to 20 individuals have been reported. Occurs in forests, woodlands and tree-lined waterways. • Long-eared Bats (*Nyctophilus sp.*) – species commonly roost in tree hollows and under peeling bark and sometimes rooftops. Depending on the species they either roost individually or in a colony of up to 200 animals. Occurs in forests and woodland from the coast to inland arid zones depending on the species (Van Dyck & Strahan, 2008) • Northern Broad-nosed Bat (*Scotorepens sanborni*) – usually roosts in tree hollows in colonies of up to 20 bats or in buildings in colonies of up to several hundred bats. Occurs in a broad range of habitats including forests, woodlands and heathlands. • Inland Forest Bat (*Vespadelus baverstocki*) – roosts in tree hollows of small trees and abandoned buildings. Occurs in *Acacia*, *Callitris* and *Casuarina* woodlands, open eucalypt woodlands, shrubland and grassland communities. • Eastern Cave Bat (*Vespadelus troughtoni*) – have been found roosting in small groups in overhang caves, boulder piles, mines and, occasionally, buildings. They roost individually wedged into cracks or in colonies of 6-100. Occurs in tropical mixed woodland, wet and dry sclerophyll forest, along the coast and Great Dividing Range.
Breeding	Female bats are usually pregnant for 3-5 months before giving birth to their offspring. Births usually occur during a period of high food availability. The young usually reach adult size after three months. As temperate microbat species hibernate over winter, the breeding season is often separated into two phases: (1) testicular growth and spermatogenesis take place in spring and summer, shortly after which mating occurs, and (2) the sperm is stored in the female during hibernation until spring when the egg is released and fertilisation occurs. Sometimes fertilisation occurs before winter but development is delayed until spring. Pregnant female bats often congregate in maternal colonies shortly before they give birth. Newborn bats are carried everywhere with the mother bat, attached to a teat (Churchill, 2008). Specific breeding details for each microbat species in this SMP are as follows (Churchill, 2008): • Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) – mating occurs in August and a single young is born between December and March. • White-striped Freetail Bat (*Austronomus australis*) – mating and fertilisation occurs in late August and a single young is born between mid-December and late-January. Most young are weaned by May. • Northern Freetail Bat (*Chaerephon jobensis*) – pregnant females have been caught in October and November and young have been found in colonies in December and January. • Beccari's Freetail Bat (*Mormopterus beccarii*) – females give birth to a single young during the summer wet season. • Gould's Wattled Bat (*Chalinolobus gouldii*) – mating occurs around May to June and fertilisation occurs at the end of winter. This species gives birth, usually twins, in late-

Species Profile - Mircochiropteran bats	
	September. The young usually achieve adult size and independence in around six weeks. • Inland Broad-nosed Bat (*Scotorepens balstoni*) – mating has been observed in April with a single young born in mid-November. They remain attached to the female until 10 days of age and are foraging independently by January. In the northern part of their range, mating has been observed in September and twins are common. • Little Broad-nosed Bat (*Scotorepens greyii*) – pregnancy lasts from late-August until birth of twins (usually) in early-November. Not all females breed every year. • Long-eared Bats (*Nyctophilus sp.*) – females are commonly pregnant early spring and give birth to twins in October – November. Exact timing may vary slightly between species (Van Dyck & Strahan 2008). • Northern Broad-nosed Bat (*Scotorepens sanborni*) – pregnant females have been recorded in August and September. Single young are born in late-September/early-December. • Inland Forest Bat (*Vespadelus baverstocki*) – females are pregnant in November and congregate in maternity colonies. Their young are flying and independent in January. • Eastern Cave Bat (*Vespadelus troughtoni*) – pregnant females have been captured on October and births (usually single) are thought to occur in mid-to-late-November. Pregnant females congregate in maternal colonies.
Feeding	The primary food sources for microbats are insects such as moths and beetles. Most microbats are aerial forages and catch and eat their prey on the wing. Microbats also use their echolocation abilities to detect insects on the leaves of plants before plucking them from the surface (Churchill 2008).
Status	All microbats subject of this SMP are least concern under the NC Act. Colonial breeders.
Distribution on Project (Rail) study area	Detected with Anabats in “open woodland fringing watercourses and on floodplains” at various locations throughout the rail alignment.

Appendix D. DEHP Fauna Register

Department of Environment and Heritage Protection

Wildlife data records

Wildlife management

Nature Conservation Act 1992

Nature Conservation (Administration) Regulation 2006

Nature Conservation (Wildlife Management) Regulation 2006

Spotter catcher records: when dealing with an animal of a species whose habitat has been destroyed by natural disaster or is about to be destroyed by human activity

Action codes legend:

R1 = release, no further action (mark column with X)
R2 = release with first aid (mark column with V or C (V = Vet / C = Carer)
D = death (mark column with X)

Wildlife data records

Spotter catcher wildlife data records

Permit holder's name:*	
Permit number:*	**WI**
Date permit issued:	
Expiry date of the permit:	
Name of person in charge *(if applicable):*	

Permit holder's address:

Permit holder's contact number/s:

* Mandatory information fields

For period:

		Capture location					Release details				Actions				
*Collector's name/s * *	*Start date * *	*Latitude * *	*Longitude * *	*Count type**	*Status**	*Scientific name / common name * *	*Count**	*Date**	*Latitude * *	*Longitude * *	*R1*	*R2*	*D*	*Location description**	*Comments*

Note: To insert extra lines in Windows 7 select 'Home' tab then click the 'Cells' tab and select 'insert sheet rows' otherwise go to the ' Insert' menu and click 'Rows'.

Return in electronic format to:

The Wildlife Ranger in the regional office that issued your permit.

Appendix E. DEHP Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland

Department of Environment and Heritage Protection

Code of Practice

Care of Sick, Injured or Orphaned Protected Animals in Queensland

Nature Conservation Act 1992

Great state. Great opportunity.

Queensland Government

Prepared by: Nature Conservation Services Branch, Department of Environment and Heritage Protection

Approved in accordance with section 174A of the *Nature Conservation Act 1992*

Acknowledgements

This code of practice has been prepared by the Department of Environment and Heritage Protection in consultation with the Queensland Wildlife Rehabilitation Council, RSPCA Queensland and the Department of Agriculture, Fisheries and Forestry.

March 2013

Table of contents

1. Purpose of this code

1 This code of practice (the code) has been prepared by the Department of Environment and Heritage Protection (EHP) in consultation with the Department of Agriculture, Fisheries and Forestry (DAFF), RSPCA Queensland (RSPCA Qld), the Queensland Wildlife Rehabilitation Council (QWRC) and the wildlife care community. This code will ensure that the activities of all parties involved in the care and rehabilitation of native animals in Queensland result in the best possible conservation and animal welfare outcomes for rehabilitated animals and the wild populations they are returned to.

This code is made under the *Nature Conservation Act 1992* (the Act), and in consideration of the Nature Conservation (Wildlife Management) Regulation 2006 (the Wildlife Management Regulation), Nature Conservation (Administration) Regulation 2006 (the Administration Regulation), Nature Conservation (Wildlife) Regulation 2006 (the Wildlife Regulation), *Animal Care and Protection Act 2001, Veterinary Surgeons Act 1936* and *Workplace Health and Safety Act 1995.*

1.1 The purpose of this code is to provide information, recommendations, minimum standards and guidelines to ensure that all parties involved in the care and rehabilitation of protected animals in Queensland do so in an appropriate manner.

1.2 The code emphasises the responsibility of all persons and organisations involved in the care, rehabilitation and release of sick, injured or orphaned protected animals to ensure that:

1.2.1 animal welfare meets acceptable standards

1.2.2 conservation benefits are maximised

1.2.3 adverse ecological outcomes are avoided

1.2.4 risks to human health and safety are minimised.

1.3 The code gives due regard to the many factors that determine what is appropriate in the circumstances, including:

1.3.1 current community values and expectations regarding the management and rehabilitation of sick, injured or orphaned animals

1.3.2 the values and opinions of wildlife rehabilitators and others with expertise

1.3.3 the importance of minimising the suffering of sick, injured or orphaned animals, and in particular the role of timely euthanasia in appropriate cases

1.3.4 the responsibility of EHP to protect and conserve the environment, ecosystems and wildlife

1.3.5 the risks to human health and safety associated with the rescue, care and rehabilitation of protected animals in Queensland

1.3.6 the relevant legislation as stated in section 1 under ‘Purpose of this code’

1.3.7 the availability of resources, such as access to veterinary facilities or expertise.

1.4 There are other Acts and legislative instruments that may make provisions about, or affect certain aspects of wildlife care and rehabilitation, such as local laws regarding the keeping of animals, or laws about trespassing on private property. It is **not** the intent of this code to deal with all of these provisions.

2. General information

2.1 All native birds, mammals (except the dingo outside protected areas), reptiles and amphibians and, some native fish and invertebrates in Queensland are protected under the *Nature Conservation Act 1992*.

2.2 EHP is the agency responsible for the assessment and licensing of individuals and organisations for the purposes of wildlife rehabilitation. Licensed individuals or entities are referred to herein as 'permit holders'.

2.3 DAFF is the agency responsible for administering the *Animal Care and Protection Act 2001*.

2.4 QWRC is the peak representative body for the wildlife rehabilitation community in Queensland. The council's focus is to ensure excellent welfare for native animals during and after rehabilitation to achieve, complement and advance conservation benefits and outcomes.

2.5 This code applies to all individuals, organisations and members of organisations operating under a rehabilitation permit.

2.6 A person who rescues a protected animal, but is not a licensed rehabilitator, must surrender it to a licensed rehabilitator or conservation officer within 72 hours of taking the animal into care as stated in section 59 (4) of the Nature Conservation (Wildlife Management) Regulation 2006.

2.7 A person or organisation engaging in wildlife rehabilitation must be licensed. It is the responsibility of the permit holder to ensure compliance with the provisions of this code.

2.7.1 EHP is responsible for administration of this code.

2.7.2 this code does **not** exempt a person or other entity from compliance with any Act, regulation or other statutory instrument.

2.7.3 this code is current at the time of publication and may be subject to periodic review.

2.7.4 a wildlife rehabilitator may only rehabilitate an animal of a species for which they hold a relevant permit. If the rehabilitator is a member of a rehabilitation organisation, they will require the approval of the organisation to rehabilitate that particular species.

2.7.5 EHP may approve the development and distribution of species-specific standards for native wildlife rehabilitation. Meeting any such standards that may be in place is a requirement in order to comply with the code.

2.7.6 to ensure compliance with local government laws, rehabilitators may also require local government approval to conduct the activity at the specified location.

2.8 This code (sections 1–18) will have immediate effect from the date of gazettal. Appendix A (Minimum enclosure size) will have immediate effect from the date of gazettal of the code for any new enclosures being built or purchased. Existing enclosure facilities must be upgraded to meet the minimum enclosure size requirements within 24 months of the gazettal date of the code.

Note: All persons intending to become licensed, or become a member of an organisation that is licensed, to care for sick, injured or orphaned protected animals should become familiar with the *Animal Care and Protection Act 2001*.

3. Principles underpinning this code

3.1 The fundamental principles underpinning this code that should guide wildlife rehabilitators at all times in the conduct of their activities are:

3.1.1 **Duty of care:** under section 17 of the *Animal Care and Protection Act 2001*, a person in charge of an animal during its rescue, care, rehabilitation or release has a statutory duty of care to appropriately provide for the animal's welfare.

3.1.2 **Avoid harm:** in rescuing, caring for, and returning native animals to the wild, there is a risk of adverse animal welfare and ecological outcomes. Even well intentioned care or treatments may prolong or worsen an animal's suffering, and inappropriate release of animals may have significant detrimental effects on local ecosystems and wildlife communities. At all stages of the rehabilitation process the potential for adverse animal welfare and ecological outcomes must be considered and avoided.

3.1.3 **Avoid risks to human health and safety:** in rescuing, caring for, and returning native animals to the wild, there are generic, situation-specific and species-specific risks to persons involved that must be considered and minimised.

Note: Anyone involved in the rescue, care and handling of wildlife should contact their general practitioner or local immunisation provider for more information on appropriate disease prevention measures including any recommended or required vaccinations.

3.1.4 **Relieve suffering:** a main objective of wildlife rescue and rehabilitation is to relieve suffering in sick, injured or orphaned wildlife; it is **not** to protect and preserve life at all costs. In this way, the objectives of wildlife rehabilitation are fundamentally different from those of human medicine. The rehabilitation and release of wildlife to the wild is the primary objective, but it must **not** be pursued to preserve the life of an animal at all costs or to achieve broader conservation outcomes where the animal is subject to unjustifiable and unreasonable suffering.

3.1.5 **Fair, reasonable and appropriate measures:** in deciding what is fair, reasonable and appropriate, regard must be had to:

- the environment and circumstances of the animal
- the steps a reasonable person would reasonably be expected to have taken under the circumstances.

3.2 These fundamental and guiding principles should be applied to all aspects of the rescue, care, rehabilitation and release of rescued animals, and appropriate application of these principles will assist wildlife rehabilitators and organisations in complying with the code.

4. General provisions for the care of **sick, injured or orphaned** protected animals

4.1 The broad objectives of the rescue and rehabilitation of sick, injured or orphaned protected animals are to:

4.1.1 relieve suffering in sick, injured or orphaned protected animals by providing appropriate husbandry and care, pain relief, veterinary treatment when required, and timely euthanasia in cases with a poor prognosis

4.1.2 contribute to the conservation of nature by promptly returning suitably rehabilitated animals to their native habitats.

4.2 Additional outcomes of the rescue and rehabilitation of sick, injured or orphaned protected animals include:

4.2.1 contribution to the body of knowledge on the ecology, conservation, management, veterinary care, husbandry and behaviour of native animal species

4.2.2 contribution to the education of the general public, business and industry professions on issues related to the conservation and welfare of native animals.

4.3 Meeting the 'capacity to care' concept:

4.3.1 The concept of 'capacity to care' relates to the capacity of a rehabilitator or rehabilitation organisation to provide for the essential needs of rescued animals as well as have the resources necessary to appropriately prepare wildlife for release back into the wild.

4.3.2 When a person's or organisation's capacity to care is exceeded, unacceptable standards of animal care or welfare may result. This is likely to occur when the need for rescue and rehabilitation services exceeds the ability of rehabilitators and organisations to provide appropriate care. This is particularly so when major environmental or other events result in significantly increased wildlife casualties.

4.3.3 Rehabilitators and rehabilitation organisations should be mindful of their respective capacities to care, particularly when there is an influx of wildlife requiring care due to major incidents like bushfire, significant weather events and other natural disasters.

4.3.4 When the capacity to care is exceeded and animal welfare standards are likely to be compromised, there are three acceptable management options, which are, in order of preference:

4.3.4.1 referral of animals to another licensed individual or organisation with a current capacity to care for that species

4.3.4.2 increase the capacity to care by increasing or pooling resources

4.3.4.3 lower the euthanasia threshold in combination with early triage of newly rescued wildlife and proper veterinary assessment and prognosis of animals in care.

4.3.5 Wildlife rescue and rehabilitation organisations should develop protocols and procedures that clearly define appropriate actions and responses in the event of catastrophic events or other circumstances in which the defined capacity to care may be exceeded.

For example: Policies and procedures relating to the establishment of good communication, collaboration and pooling of resources between organisations during major wildlife events.

4.3.6 The lowering of animal welfare standards such that they are **not** consistent with this code is **not** an acceptable response to exceeding the capacity to care.

4.3.7 In circumstances that involve major or catastrophic events and where the capacity to care is exceeded, lowering the threshold for euthanasia is a more appropriate response than **not** rescuing animals in distress.

5. Restrictions on caring for specialist protected animals

5.1 The species listed below may have requirements outside the normal capacity of most rehabilitators. Additional requirements are placed upon rehabilitators who intend to keep these species to improve the likelihood of their successful rehabilitation and return to the wild.

5.2 Permits may only be granted to persons assessed as having the appropriate skills and facilities to house and care for the following wildlife:

5.2.1 Cassowary:

contact EHP.

5.2.2 Echidna:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of this species.

5.2.3 Emu:

contact EHP. This species may only be rehabilitated on rural-residential and rural land.

5.2.4 Koala:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of this species.

5.2.5 Raptors:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of the relevant species. Only carers who are affiliated with a Raptor Association or those with a proven record and suitable facilities in raptor rehabilitation may keep raptors.

5.2.6 Reptiles:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of the relevant species.

5.2.7 Marine turtles:

contact EHP.

5.2.8 Platypus:

contact EHP.

5.2.9 Flying-foxes and insectivorous bats:

all persons caring for flying-foxes and insectivorous bats must be vaccinated against Australian Bat Lyssavirus (ABL) and must regularly consult their General Practitioner or Public Health Unit to maintain up-to-date vaccinations.

Note: In certain, prescribed circumstances, the use of lethal measures (shooting) is permitted for controlling flying-foxes damaging crops, in accordance with the 'Code of Practice – Ecologically sustainable lethal take of flying-foxes for crop protection'. Where this occurs, live, orphaned young may be given to a wildlife rehabilitator for the purpose of rehabilitation or humanely euthanased.

5.2.10 Seabirds:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of the relevant species.

6. Interpretations

6.1 Objectives

6.1.1 Objectives are the intended outcome(s) for each section of this code.

6.2 Standards

6.2.1 Standards describe the mandatory specific actions required to achieve acceptable levels of animal welfare and successful wildlife rehabilitation. These are the minimum standards that must be met. They can be identified in the text by the heading ‘Standards’ and the use of the word ‘must’.

6.3 Guidelines

6.3.1 Guidelines describe agreed best practice based on scientific information, accumulated experience and consultation. A guideline is usually a higher standard of care than minimum standards, except where the standard is best practice. Guidelines are identified in the text by the heading ‘Guidelines’ and the use of the word ‘should’.

7. Provision of veterinary care

7.1 Objective

7.1.1 To rapidly assess the veterinary requirements of sick, injured or orphaned protected animals and provide an appropriate level of relief from distress, pain and suffering as well as appropriate veterinary care.

7.2 Standards

7.2.1 A sick or injured animal must receive a standard of care appropriate for its injuries or illness as soon as possible.

7.2.2 An animal that is affected by a critical (see section 18 for definition) injury or illness must be provided with appropriate veterinary care. This includes the provision of appropriate and ongoing pain relief and monitoring by a suitably experienced and qualified person; or prompt referral to a person or organisation able to provide that care; or euthanasia as soon as possible using an approved method. For an approved euthanasia method refer to section 12 of this code.

7.2.3 An animal that is affected by a serious (see section 18 for definition) injury or illness, or that is likely to be suffering from moderate pain, must be provided with appropriate pain relief and veterinary care as soon as is practicable.

7.2.4 An animal that is affected by a mild (see section 18 for definition) injury or illness, or that is likely to be suffering only mild discomfort or pain, must be provided with appropriate veterinary care as soon as is practicable.

7.2.5 A person must **not** hold a critically or seriously ill or injured animal without providing appropriate veterinary care, when such veterinary care is reasonably accessible.

7.2.6 Unless authority has first been received from a conservation officer, a wildlife rehabilitator must **not** request a veterinarian to perform the following surgical procedures:

7.2.6.1 amputation of a limb, or part of a limb, other than a single digit

7.2.6.2 removal of an eye

7.2.6.3 amputation of more than one third of the tail of a mammal, bird or reptile, other than a skink, gecko or legless lizard

7.2.6.4 perform a procedure that results in the animal being unable to reproduce (sterilisation)

7.2.6.5 any other procedure that might reasonably be expected to reduce an animal's fitness or ability to survive upon release back into the wild.

7.2.7 Notwithstanding section 7.2.6, a surgical procedure must not be withheld if gaining authority from a conservation officer will result in an unacceptable delay that may contribute to unnecessary suffering.

7.2.8 Wildlife rehabilitators must take all reasonable steps to avoid or minimise stress on animals in care and must **not** deliberately or negligently expose an animal to unnecessary stress.

7.3 Guidelines

7.3.1 A wildlife rehabilitator or wildlife rehabilitation organisation should establish a working relationship with a veterinarian, veterinary practice or facility able to provide veterinary care for rescued native animals.

Note: For the purposes of this code an animal's injuries or illness may be described as:

Critical (see section 18 for definition);

For example: an animal that has been struck by a car and has a serious head injury.

Serious (see section 18 for definition);

For example: an animal with a closed fracture of a long bone, but no other apparent injuries, and that is bright, alert and responsive; a koala with severe cystitis.

Mild (see section 18 for definition);

For example: an animal that has sustained superficial cuts or bruising as a result of inter-species or intra-species fighting or an orphaned marsupial suffering from mild dehydration.

7.3.2 The determination of what is 'appropriate veterinary care' should take into account the circumstances and availability of veterinary facilities and expertise, and the nature and severity of the injuries and/or illness of the animal.

For example: 'appropriate veterinary care' has **not** been provided to a critically or seriously injured or ill animal if it has received only a single treatment, without ongoing veterinary care and/or monitoring.

Note: a person must **not** hold a seriously injured or ill animal overnight without appropriate veterinary treatment, when access to 24-hour veterinary care is available.

7.3.3 The most appropriate facility in the circumstances should be used for the provision of veterinary care to seriously sick or injured protected animals.

For example: when specialised wildlife veterinary facilities are readily available and accessible. These should be used in preference to a private veterinary surgeon.

8. Rescue and handling

8.1 Objective

8.1.1 To eliminate additional stress and further injury to wildlife during rescue and in care and to maximise the safety of rescuers and the general public.

8.2 Guidelines

8.2.1 A wildlife rehabilitator should not conduct a rescue when doing so would put themselves or other persons at risk of serious injury.

8.2.2 Wildlife rehabilitators should ensure that they utilise correct personal protective equipment (PPE) relevant to the species that they are rescuing.

For example: eye protection when handling waterbirds, gloves when handling bats, towels/blankets for handling most species, and covered footwear should be worn at all times. For rescues in bushland or long grass, rescuers should also wear long sleeved shirts and long trousers.

8.2.3 Prior to undertaking a wildlife rescue the rescuer should assess the associated risks and put in place measures to ensure the safety of themselves, others and the wildlife to be rescued.

8.2.4 Wildlife rescues should be carried out in a way that avoids significant disturbance to unaffected wildlife that is likely to cause injury or abandonment of young.

8.2.5 The rescue and handling of wildlife should **avoid** causing unnecessary pain, suffering or exacerbation of injuries.

8.2.6 The rescue and handling of wildlife should be done in a manner that will not cause or spread disease.

8.2.7 Only the appropriate equipment and techniques for the species and size of the animal concerned should be used. Equipment and techniques that should **not** be used include:

8.2.7.1 the noosing of a koala

8.2.7.2 the use of a projectile, other than a net-gun or tranquiliser dart by an appropriately trained and licensed person

8.2.7.3 the use of unpadded snake tongs

8.2.7.4 the use of a leg-hold trap with unpadded jaws or an unattended snare or automatically activated snare

8.2.7.5 the felling of a tree containing an animal, when the tree has a diameter at chest height (DBH) exceeding 5 centimetres (cm), or when injury to the animal being rescued or any other animal is a likely consequence, or when the tree is in a protected area.

8.2.8 Where the difficulty of a wildlife rescue is compounded by the presence of other persons or dangers such as heavy traffic, a rescuer should opt for the assistance of local authorities (i.e. local council or police) to mitigate these factors.

8.2.9 Where the rescue of animals in warm or hot ambient conditions (>24°C) cannot be avoided, or when the animal has been subject to exertion or physical restraint, rescuers should monitor the body temperature of the animal and/or seek appropriate veterinary assistance.

8.2.10 Rescuers should monitor healthy nestling and fledgling birds for abandonment rather than attempt to bring the bird into care. Nestlings can be returned to the nest or placed in an artificial nest. Fledglings can be returned to a tree where they were found or in some cases a tree nearby, if determined to be free of injuries or disease by a suitably qualified or experienced person.

8.2.11 Where possible, handling and restraint should be minimised and chemical restraint methods such as sedation and anaesthesia used whenever possible by those appropriately qualified and/or licensed to do so.

Note: Sedatives and anaesthetics must be administered by a veterinary surgeon or authorised person.

8.2.12 The use of padded snake tongs should be limited to situations in which there is no other alternative, and in which there is significant risk to human life. Snake tongs, even when padded, may cause significant internal injury, particularly to gravid (pregnant) snakes. Such injuries may **not** be immediately apparent and may result in the death of the snake weeks or months later.

8.2.13 Only persons who are vaccinated against rabies should handle any bat species.

9. Transportation

9.1 Objective

9.1.1 To transport wildlife in such a way that minimises further stress and injury and prevents escape. This section applies to the movement of all sick, injured or orphaned wildlife (e.g. from the point of rescue to a veterinary surgery and between rehabilitation facilities and to the release site).

9.2 Standards

9.2.1 Transport must not cause unnecessary pain or distress to the animal.

9.2.2 Sick, injured or orphaned wildlife must only be transported when and where necessary.

9.2.3 Transport containers must be appropriate for the species (i.e. the size, strength and behaviour of the wildlife being moved).

9.2.4 Transport containers must be designed and maintained in such a way as to:

9.2.4.1 prevent injury

9.2.4.2 prevent escape

9.2.4.3 prevent rolling or tipping during transit

9.2.4.4 prevent damage to plumage

9.2.4.5 be hygienic

9.2.4.6 minimise stress

9.2.4.7 be suitably ventilated.

9.2.5 Transport containers that hold species that are dangerous, venomous or capable of transmitting potentially fatal zoonoses must be clearly marked with a warning label such as 'Caution—venomous snake' or 'Caution—live bat', and must be locked and secured.

9.2.6 Wildlife must not be transported in a vehicle's boot that is separate from the main cabin without ventilation.

9.2.7 Non-compatible species, such as predator and prey combinations must not be transported in a manner that allows physical or visual contact.

9.2.8 Transport containers for wildlife must:

9.2.8.1 be secured to prevent movement during transport causing stress or injury to the animal

9.2.8.2 provide protection from direct sunlight

9.2.8.3 provide protection from wind and rain.

9.3 Guidelines

9.3.1 Transport containers that are **not** of a fully enclosed design should be covered to minimise light, visual stimulation and stress.

9.3.2 The use of medication during transport should be considered and approved by a veterinary surgeon.

9.3.3 The provision of water and food for adult animals is generally **not** required for short trips (2–3 hours). Food and water should be considered when transporting dependent young and adult animals during longer trips.

9.3.4 Wildlife should **not** be transported in the back of an uncovered utility vehicle unless the transport container is securely fastened.

9.3.5 Transport containers should be maintained within an appropriate temperature range for the species. Unfurred joeys and bird and monotreme hatchlings should be within the 31–34°C range. 25–27°C is appropriate in most other cases.

9.3.6 An experienced rehabilitator or veterinary surgeon should be consulted if it is uncertain what an appropriate temperature range is for a specialised species.

10. Housing

10.1 Objective

10.1.1 To ensure that wildlife undergoing rehabilitation are housed in a way that prevents injury or escape, minimises stress, maintains safe levels of hygiene and allows natural behaviours.

10.2 Standards

10.2.1 Enclosures must be constructed and maintained in such a way to prevent injury and escape and exclude predators and pests.

10.2.2 Enclosures must be appropriate for the species, and the types of injuries, stage of development and/or stage of rehabilitation of the animal being housed.

10.2.3 Enclosures must maintain habitat elements appropriate to the species and the condition of the animal (e.g. perching, nest boxes, resting forks, wading pools, suitable substrate).

10.2.4 Enclosures housing wildlife **not** subject to critical care must allow for the display of natural behaviour and support rehabilitation for survival in the wild.

10.2.5 All enclosures must meet the dimensions (relevant to the species in care) described in Appendix A of the code. These dimensions are regarded as the minimum standards that must be met.

10.2.6 All housing, including enclosures, nest boxes, bedding, substrate, perching, food and water bowls must be kept in a clean and hygienic condition.

10.2.7 Cleaning and disinfection regimes must be appropriate for the species and excreta must **not** be allowed to accumulate excessively in any enclosure, substrate or bedding.

10.2.8 Species that are dangerous to humans, venomous or those known to carry life threatening zoonoses must be securely contained to prevent unauthorised human contact and exposure to domestic animals.

10.2.9 Animals showing signs of infection or disease must be quarantined from other wildlife in care. Animals subject to quarantine must be housed in such a way as to prevent transmission of disease or infection to other animals.

10.2.10 Wildlife in care must **not** be exposed to other native or domestic animals where the exposure is likely to result in unnecessary familiarisation or stress.

For example: native wildlife and a domestic dog, cat or recognised predator sharing the same space or having contact.

10.2.11 Wildlife in care must **not** be exposed to odours or noises that are likely to result in unnecessary familiarisation, stress or illness. Use of certain aerosols and insect repellents can be toxic to animals in care and should be avoided.

For example: cigarette smoke in an enclosed area or loud music.

10.2.12 Incompatible species or individuals must not be housed in the same enclosure, or within sight of each other.

10.3 Guidelines

10.3.1 Enclosures should be designed to allow easy cleaning, easy access and minimise handling of wildlife.

10.3.2 Faeces and uneaten food should be removed daily (more frequently if needed) and disposed of in such a way as to limit access by other animals and the potential spread of disease.

10.3.3 Food and water containers should be cleaned with a suitable (non-toxic to wildlife) disinfectant daily.

10.3.4 Household and animal-related cleaning implements and products should be kept separate to avoid cross contamination.

10.3.5 Wildlife husbandry items should be cleaned in areas separate to those used to wash domestic or household items.

10.3.6 Rehabilitators should avoid mixed-species housing whenever possible and, when mixed-species housing is necessary (such as in pre-release bird aviaries), ensure that only compatible species are housed together. Any new additions to an existing aviary, colony or mob should be monitored closely for the first few days to ensure their safety and the safety of other individuals.

10.3.7 Animals that naturally form social groups in the wild should be housed with animals of an appropriate age and gender of the same species where possible. When animals are housed collectively, they should be individually identifiable.

10.3.8 Potential stressors that could have a detrimental health effect on an animal should be identified and removed from an enclosure. Ongoing or prolonged stress can result in reduced growth rates, weight loss, abnormal behaviour (e.g. self-mutilation), inhibited recovery and increased mortalities. More subtle and psychological signs of stress could be repetitive stress-related behaviour (stereotypical behaviour) such as pacing.

Note: If carers are in any doubt of an animal's capacity to deal with the unavoidable stresses of coming into care, or there are unknown causes for unusual behaviour, they should consult experienced carers for that species. Unmanaged issues relating to ongoing or prolonged stress while in care will compound the original health problems, making a full recovery less likely. Similarly, communication and cooperation between wildlife rehabilitators and rehabilitation organisations are encouraged to maximise the use of available appropriate housing and facilitate the housing of social species into groups at an appropriate stage and/or age prior to release, where possible.

11. Food and water

11.1 Objective

11.1.1 To ensure that sick, injured or orphaned wildlife receive a diet that supports their healthy recovery and development, and their effective rehabilitation and release.

11.2 Standards

11.2.1 Rehabilitators must be aware of the appropriate food and water requirements for the particular species in the wild and in care. Advice must be sought from a person experienced in rehabilitating a species where a rehabilitator is unfamiliar with its care.

11.2.2 Food and water of suitable quality and quantity for the species must be provided at an appropriate frequency and must not be accessible to other wild or domestic animals.

11.2.3 The feeding of live non-native vertebrate animals to an animal under rehabilitation must not occur unless the feeding of live food is essential for the rehabilitated animal's survival.

11.2.4 Live protected animals must not be used for the purpose of feeding an animal under rehabilitation. It is permissible to collect a dead least concern animal (e.g. fresh road kill), other than a special native animal (echidna, koala, platypus, wombat), if the dead animal is taken to feed the bird of prey kept under a rehabilitation permit.

11.2.5 Food quantities must be adjusted to reflect an animal's stage of development and to maintain a weight that is within an appropriate range. Guidance on this can be obtained from wildlife rehabilitation organisations and facilities.

11.2.6 Prior to release food must be offered in a way that encourages natural feeding behaviour such as foraging.

11.2.7 An animal that is unable or unwilling to feed sufficiently (other than nursing young) must be assessed by a veterinarian or a suitably experienced person to diagnose the cause of the inability to feed.

11.2.8 Prior to undertaking the force feeding of an animal, a rehabilitator must have received training from a suitably experienced person (i.e. experienced wildlife rehabilitator or veterinarian) for that particular species.

11.2.9 Food and water for wildlife must not be allowed to become contaminated by wild or domestic animals.

11.2.10 Food must be provided in a manner that minimises food contamination and spoilage and the transfer of disease.

11.3 Guidelines

11.3.1 To the greatest extent possible, captive diets should be similar to the natural diet for the species to minimise diet-related health issues, to teach food recognition for release back into the wild and promote normal digestive function.

11.3.2 Animals should be weighed at least weekly to determine overall health and to mitigate weight loss through dietary changes.

11.3.3 Vitamin and mineral deficiency is a disorder associated with prolonged captivity in a wide range of species, and should be anticipated and prevented by provision of a proper diet with vitamin and mineral supplementation. Care should be taken when adding supplements to an animal's diet as incorrect quantity can also cause dietary problems.

11.3.4 Whenever practicable, prior to release, animals should have foods included in their diet that would be available to them in the area where they are to be released.

11.3.5 To avoid contamination and disease transfer, wildlife and human food preparation areas and implements should be kept separate.

12. Euthanasia

12.1 Objective

12.1.1 To support the timely euthanasia of sick, injured or orphaned wildlife through identifying when euthanasia is appropriate.

Note: Euthanasia is a large part of wildlife rehabilitation and an important welfare tool. It should not be seen as a failure on the rehabilitator's behalf, nor should it be avoided at **all** costs.

12.2 Standards

12.2.1 All wildlife rehabilitators, whether individually licensed or operating under a group licence, must be able to provide for the euthanasia of wildlife when required.

12.2.2 Wildlife must be euthanased without exception when:

12.2.2.1 it is necessary to alleviate significant pain or suffering when such pain and suffering is not able to be managed by a veterinarian

12.2.2.2 further treatment is **not** practical or recovery is **not** expected such that the animal can be successfully rehabilitated to the wild

12.2.2.3 resources are **not** available to provide appropriate care or an acceptable quality of life throughout the likely rehabilitation period.

12.2.3 Animals with a poor prognosis for survival and that are suffering must be euthanased rather than left to die from the injury or illness. Failure to take appropriate steps to arrange the prompt euthanasia of these animals is a breach of the *Animal Care and Protection Act 2001*.

12.2.4 Unless EHP has granted permission for the animal to enter the Queensland Species Management Plan (QSMP) or unless otherwise advised by the EHP Director Wildlife Management, an animal must be euthanased when:

12.2.4.1 an orphaned animal is not viable or is unlikely to be rehabilitated

12.2.4.2 there is no suitable release location (refer to sections 15.2.4 and 15.2.6 regarding release/alternative release locations)

12.2.4.3 the ability to reproduce is lost due to an injury, disease or surgical procedure

12.2.4.4 the ability to move freely or normally (i.e. run, climb, crawl, hop, fly or swim) is permanently impaired due to, for example, a missing or impaired limb, wing, foot or tail, such that it will significantly impair the animal's ability to survive in the wild

12.2.4.5 the ability to sense environment (i.e. see, hear, smell, taste or feel) is permanently impaired due to a missing or injured organ such as an eye, ear or nose, such that it will significantly impair the animal's ability to survive in the wild

12.2.4.6 the ability to catch, find or handle food is permanently impaired

12.2.4.7 its advanced age renders it unlikely to survive in the wild.

12.2.5 The carcasses of euthanased animals must be discarded in accordance with the local regulations. Carcasses of animals euthanased using anaesthesia and/or veterinary euthanasia solutions may present a significant risk to scavengers, including native animals, and must be disposed of by deep burial or incineration.

12.2.6 Carcasses of animals euthanased by way of barbiturate overdose must not be fed to other animals.

12.3 Guidelines

12.3.1 Wildlife should be euthanased when suffering from injuries or illness that require a long and complicated rehabilitation process and when such wildlife provide little contribution to the conservation of the species.

12.3.2 Non-releasable wildlife should be euthanased (as per section 12) or referred for placement through the QSMP. For further information on non-releasable wildlife or the QSMP, contact your local EHP office.

13. How to euthanase

13.1 Objective

13.1.1 To support the timely euthanasia of sick, injured or orphaned wildlife by identifying who may perform euthanasia and what methods may be applied.

13.2 Standards

13.2.1 Methods of euthanasia, including methods of restraint for euthanasia, must not cause significant pain, suffering or distress.

13.2.2 Death must be confirmed prior to the disposal of the carcass.

13.2.3 Euthanasia by barbiturate overdose must only be performed by a veterinary surgeon or a competent and appropriately trained person authorised by the chief executive of Queensland Health to possess and use restricted drugs for veterinary purposes.

13.2.4 If euthanasia via intracardiac or intrathoracic (as opposed to intravenous) barbiturate overdose is performed then the animal must be fully anesthetised prior to performing the procedure.

13.2.5 The following euthanasia methods must **not** be used on wildlife:

13.2.5.1 suffocating via drowning, strangulation or chest compression

13.2.5.2 freezing

13.2.5.3 burning

13.2.5.4 poisoning with household products

13.2.5.5 air embolism

132.5.6 exsanguination or decapitation without stunning

13.2.5.7 electrocution or microwave irradiation

13.2.5.8 poisoning with any domestic or agricultural pest control agent, chemical or noxious agent not currently approved for the veterinary euthanasia of domestic animals.

13.3 Guidelines

13.3.1 Animals should be euthanased by barbiturate overdose while under general anaesthesia administered by a veterinary surgeon or an appropriately trained person authorised by the chief executive of Queensland Health to possess and use restricted drugs for veterinary purposes.

13.3.2 When it is **not** practicable to perform euthanasia using barbiturate overdose a method appropriate for the species that causes minimal pain and suffering should be used. This may include the following methods:

13.3.2.1 Large animals shot with a rifle of a calibre sufficient to achieve instantaneous insensibility followed by the rapid death of the animal without first regaining sensation or consciousness. In effect, the technique must destroy the brain.

Note: The use of a firearm for the euthanasia of wildlife must comply with the *Weapons Act 1990*.

13.3.2.2 Cranial trauma sufficient to cause instantaneous insensibility followed by the rapid death of the animal without first regaining sensation or consciousness. In effect, the technique must destroy the brain

Note: The brain of reptiles is very small in comparison with their head size, and well protected by the bones and soft tissues of the head. Cranial trauma techniques used on reptiles must cause instantaneous and complete destruction of the brain.

14. Release of rehabilitated protected animals

14.1 Objective

14.1.1 To ensure that only wildlife that possess an appropriate level of physical, cognitive and behavioural fitness are released to the wild.

14.2 Standards

14.2.1 Rehabilitated wildlife must be assessed as physically and behaviourally fit by a wildlife veterinarian or a rehabilitator experienced in that species prior to its release.

14.2.2 An animal must only be deemed physically fit for release if:

14.2.2.1 it has fully recovered from any pre-existing injury

14.2.2.2 reasonable steps have been taken to determine the animal is free of disease

14.2.2.3 its weight and body condition are within the normal range for the animal's age, sex and species

14.2.2.4 it has adapted to prevailing climatic conditions

14.2.2.5 it is not known to be sterile/unable to reproduce.

14.2.3 The following process must be followed regarding amphibians:

14.2.3.1 an amphibian must only be released in suitable habitat as close as practicable to the same location from which it was originally taken to minimise the potential spread of parasites and disease and impacts on genetic integrity.

14.2.3.2 it is **not** permissible to release an amphibian at a location that is only similar to or near the original location, or at a location that is only assumed to be the original location.

14.2.3.3 if the original location of the amphibian is not known, the animal may be suitable to enter into the QSMP. Contact your local EHP office to arrange for the animal to be assessed.

14.2.3.4 if the amphibian is not suitable to enter the QSMP, it must be euthanased.

14.2.4 An animal must only be deemed behaviourally fit for release if it:

14.2.4.1 can recognise, catch and consume naturally available food

14.2.4.2 has not been allowed to associate with domestic animals and predator species during the rehabilitation period so as to ensure that its natural instinct to recognise and avoid predators, including domestic animals, remains intact

14.2.4.3 is **not** attracted to humans or to sights, sounds or smells that are specific to captivity (i.e. it is **not** imprinted or humanised)

14.2.4.4 can navigate effectively through its natural environment

14.2.4.5 can recognise and interact appropriately with members of the same species.

14.3 Guidelines

14.3.1 Species that are required to construct shelters for survival (e.g. dig burrows or construct dreys) should exhibit this behaviour prior to release.

15. Release timing and site selection

15.1 Objective

15.1.1 To ensure that the release timing and site chosen for rehabilitated wildlife maximises the chances of survival in the wild and has minimal negative impact on wild populations.

15.2 Standards

15.2.1 Wildlife must not be released in weather conditions that are likely to cause significant hardship or reduced chances of survival.

15.2.2 To allow wildlife to immediately investigate its environment and avoid predation, release must take place during the species' normal period of activity (e.g. diurnal, nocturnal, crepuscular).

15.2.3 Migratory species must be released one month prior to their typical departure period or at a time when other members of the species are present if the location is within a migratory path. Due to time in care, the animal may need to be kept in care until the following migratory season.

15.2.4 If the location where the wildlife was found is known and is suitable for the release then the wildlife must be released there. A suitable environment for release is one that:

15.2.4.1 contains appropriate habitat, shelter, water and food resources

15.2.4.2 is free of immediate hazards or risks (i.e. not a roadside)

15.2.4.3 is known **not** to be subject to imminent land-clearing or development.

15.2.5 The release of koalas to the wild must be conducted in accordance with the relevant provisions outlined in the Nature Conservation (Koala) Conservation Plan 2006.

15.2.6 If the original site of capture is **not** appropriate for release (refer to section 15.2.4), then the animal must be released as close to the original site as possible. The rehabilitator needs to be aware of that particular species natural home range in order to provide the best alternative release location.

15.2.7 Wildlife must **not** be released into a national park unless the animal originated from the national park and prior approval has been obtained from EHP.

15.2.8 If a release is unsuccessful, despite repeated attempts to rehabilitate the animal for release to the wild, the animal must be euthanased (see section 12). If the animal is potentially suitable to enter into QSMP, the local EHP office must be contacted to arrange for the animal to be assessed.

15.2.9 Progeny of wildlife held on a rehabilitation permit must be released to the wild when self-sufficient. The progeny should be released at the location from where the mother originated, consistent with section 15.2.4 of the code.

15.2.10 Tagging, banding, or other marking, including microchip or PIT implanting, may only be performed by a person who is authorised by EHP to tag wildlife or by a registered veterinary surgeon, and must only be performed as part of an EHP approved program.

15.3 Guidelines

15.3.1 An animal should be released as soon as it is deemed ready and the conditions are suitable.

15.3.2 Environmental conditions should be suitable for the release, taking into account the weather and time of year which will help facilitate the animal's reintroduction to the wild and its survival. For example:

15.3.2.1 reptiles should be released during the warmer months such as spring and summer

15.3.2.2 juvenile animals should be released during natural dispersal periods

15.3.2.3 insectivorous species should be released during periods of insect abundance.

15.3.3 The release of rehabilitated animals into habitat other than that from which they originated, should be carefully considered as it increases the risk of undesirable ecological impacts, such as:

15.3.3.1 spread of diseases and parasites into native wildlife populations

15.3.3.2 genetic contamination of genetically distinct wildlife populations, or other deleterious genetic effects

15.3.3.3 impacts on stable social structures of wildlife populations residing in recipient habitat.

15.3.4 Gradual or 'soft' release is preferred for most species whenever practicable. Abrupt or 'hard' release is not advised for animals subject to long term care, orphans or those animals requiring social groups.

15.3.5 If social species are to be managed and released as a group, then all individuals within the group should originate from the same or neighbouring location, or be within the range of normal movement from their place of origin based on the species capacity to travel.

Example: A kangaroo can be released within 100 kilometres of its origin, based on its (the species) capacity to travel long distances.

15.3.6 Regarding migratory species that have been in care for extended periods, the rehabilitator should ensure that an appropriate level of physical fitness is achieved prior to release, allowing the animal enough time to establish itself in the wild in advance of the forthcoming migration.

15.3.7 Inexperienced rehabilitators should contact an experienced rehabilitator, rehabilitation group or EHP for advice on 'soft' release of animals with a close social structure such as bats (including flying-foxes), gliders and macropods.

15.3.8 Highly social species, excepting those individuals in critical care, should be held in appropriate groups as early as possible to enable a social unit to develop before release.

16. Records

16.1 Objective

16.1.1 To maintain comprehensive records of sick, injured or orphaned wildlife admissions, disposals and management while in care. These records can be used to track and review individual case histories and identify trends and represent a useful resource for rehabilitators, regulators, veterinarians, educators and research organisations.

16.2 Standards

16.2.1 A register must be kept by each wildlife rehabilitator for all protected animals rescued or cared for including:

- 16.2.1.1 date of admission or rescue
- 16.2.1.2 identifying number or name
- 16.2.1.3 reason for rescue
- 16.2.1.4 species
- 16.2.1.5 approximate age or age class (neonate, juvenile, sub-adult, adult, aged)
- 16.2.1.6 sex (M, F, Unknown)
- 16.2.1.7 exact location of rescue
- 16.2.1.8 brief description of health or injuries
- 16.2.1.9 treatments
- 16.2.1.10 relevant observations (behaviour, diet, general progress)
- 16.2.1.11 regular weights
- 16.2.1.12 final outcome (released, died, euthanased, permanent care, transferred to another person/organisation)
- 16.2.1.13 date of final outcome
- 16.2.1.14 if transferred to another person or organisation, to whom.

16.2.2 If an animal is transferred to another rehabilitator, copies of relevant records must accompany the animal.

16.2.3 All records must be maintained in a form that can be readily examined, analysed and clearly understood, and be made available to a conservation officer upon request.

16.3 Guidelines

16.3.1 Copies or backups of records should be kept to avoid information being lost.

16.3.2 To gauge the effectiveness of various rehabilitation and release techniques, post-release sightings of known rehabilitated wildlife should be recorded and kept.

17. Wildlife rehabilitation organisations

17.1 Objective

17.1.1 To identify the roles and responsibilities of wildlife rehabilitation organisations when operating under a group rehabilitation permit.

17.2 Standards

17.2.1 An organisation conducting wildlife rescue and rehabilitation activities in Queensland must be a legal entity (incorporated association or Australian company) and hold a valid rehabilitation permit issued under the *Nature Conservation Act 1992* by EHP.

17.2.2 A licensed wildlife rehabilitation organisation must ensure that:

17.2.2.1 all members engaged in wildlife rehabilitation activities comply with this code

17.2.2.2 the organisation and its members comply with the conditions of their rehabilitation permit

17.2.2.3 the organisation provides a current copy of the rehabilitation permit to members stating the period of membership and what species the member is endorsed to care for, together with the total number of animals that the member is entitled to hold, under the group rehabilitation permit

17.2.2.4 the organisation provides new and inexperienced members with appropriate and ongoing training and mentoring for species that the individual rehabilitator wishes to care for

17.2.2.5 membership lists are updated and forwarded annually within 20 business days at the close of each financial year to Permit and Licence Management, EHP, palm@ehp.qld.gov.au or GPO Box 2454, Brisbane QLD 4001

17.2.2.6 a process is established for handling alleged breaches of this code, or non-compliance with other relevant rules of the organisation

17.2.2.7 a procedure is established for responding to complaints against members either from external or internal parties (all new members must be given copies of this procedure)

17.2.2.8 all members are given timely, clear and detailed directions by the organisation concerning the activities that the member may carry out under the rehabilitation permit.

17.2.3 The organisation must advise EHP in writing within 20 business days of any person who is no longer a member and that they are no longer permitted to operate under the permit.

17.2.4 If the organisation becomes aware that a member operating under the permit does **not** comply with this code, the organisation must:

17.2.4.1 identify the actions or steps needed to be taken by the member to comply with this code and time frames associated, and

17.2.4.2 take responsibility for the individuals' actions under the group permit, and either

17.2.4.3 limit the authority of the member to operate under the permit, or

17.2.4.4 instruct the person in writing that they are no longer permitted to operate under the permit.

17.3 Guidelines

17.3.1 Organisations should inform prospective new members of relevant matters such as the financial costs and time commitment required by the individual.

17.3.2 All wildlife rehabilitators operating under a group wildlife permit should conduct themselves according to that group's membership requirements to the extent the law permits.

17.3.3 Wildlife rehabilitation organisations should endeavour to familiarise themselves with recently updated information about diseases in wildlife. This can be done by contacting the Australian Wildlife Health Network, the Wildlife Disease Association or Biosecurity Queensland.

Note: Wildlife rehabilitation organisations are permitted to undertake fundraising activities to support member training and assist with the acquisition of resources such as husbandry items, veterinary support and food.

18. Definitions

Act—the *Nature Conservation Act 1992*.

Administration Regulation—the *Nature Conservation (Administration) Regulation 2006.*

Animal—any member of the animal kingdom (other than humans) as defined in the Act.

Conservation officer—a person who is appointed as such by the responsible Minister under the *Nature Conservation Act 1992.*

Crepuscular—pertaining to early in the morning and late in the afternoon.

Critical—when the animal is affected by: major traumatic injuries, difficult breathing, major bleeding, serious head injury, or disembowelment; or is showing any signs of severe pain or discomfort; or has obvious injuries or illness that might cause the death of the animal; or is rescued or found in circumstances which might reasonably be expected to have caused such injuries or illness, even if they are **not** apparent (for example: dog attack); or the animal is moribund.

Critical care—a level of care provided to wildlife suffering from life threatening injuries or illness. Generally, wildlife in critical care will require short-term housing that reduces activity and facilitates easy observation, feeding, treatment and rehydration as required.

Diurnal—pertaining to day time.

Euthanasia—to achieve humane destruction of an animal. The method must achieve instant insensibility followed by rapid death of the animal without it first regaining sensation or consciousness.

Experienced rehabilitator/person—a person with a minimum of two (2) years, ongoing demonstrated wildlife rehabilitation experience specific to that species or a similar species of sick, injured or orphaned wildlife.

Exsanguination—death caused through loss of blood.

Hard release—where an animal is released directly to the wild without further support, feeding or environmental conditioning. It should only be used in the case of short-term rehabilitation and is not advised for animals in long-term care, orphans or social animals.

Mild—when the animal's injuries or illness appear to cause little discomfort, pain or loss of function, and are not life-threatening or likely to become life-threatening without immediate treatment.

Nocturnal—pertaining to the night.

Permit—a rehabilitation permit issued under the Act.

Protected wildlife—an animal that is prescribed as such in the Act.

Qualified person—a person who has completed a training course approved by the chief executive of Queensland Health and is issued with an authority under the provisions of the Health (Drugs and Poisons) Regulation 1996 or a person registered by the Veterinary Surgeons Board as a Veterinary Surgeon.

Quarantine—where an animal is kept isolated for a period to ensure it does not transmit or contract disease or parasites. Rehabilitators should take precautions when entering and leaving such isolated areas, utilising disinfectant footbaths, overalls etc. The same practice should apply to all husbandry equipment used for managing an animal in quarantine.

QSMP—the Queensland Species Management Plan. This is the process for placing zoologically required species or specimens into zoo collections for conservation/education purposes in lieu of being released successfully.

QWRC—the Queensland Wildlife Rehabilitation Council.

Rehabilitation organisation—a corporation or association holding a valid rehabilitation permit whose members engage in the rehabilitation of sick, injured or orphaned wildlife.

Rehabilitator—a person who is engaged in the rehabilitation of sick, injured or orphaned wildlife and is operating under a valid rehabilitation permit either as an individual or as member of a rehabilitation organisation.

Serious—when the animal is affected by serious injuries or illness that might reasonably be expected to cause moderate pain, but are **not** immediately life-threatening; and the animal is **not** showing obvious signs of distress or pain, or significantly reduced mental activity.

Soft release—where an animal is released with the provision of supplementary food, shelter and water at the site of release, preferably with a period of confinement during which time the animal(s) become familiar with the surrounding habitat, wildlife population and supplementary resources.

Veterinary surgeon—a person registered as a veterinary surgeon under the *Veterinary Surgeons Act 1936*.

Veterinary treatment—the conduct and application of veterinary surgery and veterinary medicine when applied to sick, injured or orphaned animals by a veterinary surgeon.

Wildlife—a protected animal as defined in the Act.

Wildlife Management Regulation—the Nature Conservation (Wildlife Management) Regulation 2006.

Wildlife Regulation—the Nature Conservation (Wildlife) Regulation 2006.

Zoonosis (plural zoonoses)—any infectious disease that can be transmitted from both wild and domestic animals to humans.

19 Appendix A: Minimum enclosure size

19.1 Objective

19.1.1 To identify appropriate enclosure sizes for rehabilitation purposes for each animal group.

19.2 Standards

19.2.1 **Critical care housing** must be housing that is designed to reduce an animal's level of physical activity for a short period of time and that facilitates frequent monitoring, treatment, feeding or rehydration. Once an animal no longer requires critical care it must be transitioned to an 'intermediate care' or 'pre-release' enclosure.

19.2.2 **Intermediate care housing** must be housing that is designed to allow sufficient space for some physical activity while enabling the animal to be readily caught for monitoring or treatment.

19.2.3 **Pre-release housing** must be housing that allows an animal to regain better physical condition, display natural behaviour and acclimatise to normal weather conditions. While in pre-release housing, interactions between wildlife and humans must be greatly reduced. The pre-release enclosure sizes listed in the tables below are regarded as the minimum standards that must be applied. Rehabilitators are encouraged to exceed these sizes if possible.

19.2.4 The maximum number of individuals listed in column four of the table below can be applied to both intermediate care and pre-release housing sizes. Critical care housing sizes are for individuals. For each additional animal the floor area of all enclosures must be increased by 50%. However this does not apply to clutch mates or siblings of the same age where individual territorial boundaries are minimal.

19.2.5 While in intermediate care and pre-release housing a waterbird must be provided with a pond that contains soft substrate and meets the area specified for the animal in the table below. This area must be increased by 50% for each additional waterbird. However this does not apply to clutch mates or siblings of the same age where individual territorial boundaries are minimal.

19.2.6 The requirement for pond size to be a percentage of the total floor area does not apply if the pond size exceeds 100 square metres (i.e. 10m x 10m).

Note: The tables below are standards which **must** be followed however where enclosure dimensions fall short by a small amount e.g. 0.23 instead of 0.25 leeway may be granted.

These standards are in place as a **minimum** requirement.

For the purpose of achieving best practice for protected animals in care, rehabilitators should seek to exceed the below dimensions whenever possible for better animal welfare and management.

All rehabilitators should take care to identify individual animals that may require additional space or demonstrate the need for specific requirements to achieve a positive conservation outcome. When the capacity to care for such individual animals is limited, rehabilitators should seek advice from experienced individuals or rehabilitation organisations and make arrangements that are more appropriate (e.g. alternative placement of such individual animals).

Birds

Type of bird (examples)	Critical care L x W x H (m)	Intermediate care L x W x H (m)	Pre-release L x W x H (m)	Maximum number of individuals	Pond size (as % of total floor area)
Small passerines (finches and wrens)	0.2 x 0.2 x 0.2	1 x 0.7 x 0.7	1.5 x 1.3 x 2	6	N/A
Medium passerines (parrots and pigeons)	0.4 x 0.4 x 0.4	1.5 x 1 x 1	2.9 x 1.5 x 1.8	4	N/A
Large passerines (parrots, pigeons, magpies and cockatoos)	0.5 x 0.5 x 0.5	1.2 x 0.8 x 0.8	4 x 2 x 2	4	N/A
Small waterbirds (ducks and grebes)	0.5 x 0.5 x 0.5	2 x 1.5 x 1	4 x 2 x 2	4	50%
Large waterbirds (swans and herons)	1 x 1 x 1	2 x 2 x 1.2	6 x 3 x 2	2	50%
Small aquatic/sea birds (gulls, cormorants and terns)	0.5 x 0.5 x 0.5	1 x 0.6 x 0.6	4 x 2 x 2	2	50%
Large aquatic/sea birds (albatrosses and pelicans)	1 x 1 x 1	4 x 2.5 x 1.5	6 x 3 x 2	2	50%
Small raptors (kestrels and hobbies)	0.5 x 0.5 x 0.5	2 x 2 x 2	5 x 3 x 3	2	N/A
Medium and Large raptors (kites, large falcons, goshawks, eagles and buzzards)	0.8 x 0.8 x 0.8	4 x 3 x 3	15 x 4 x 4	2	N/A
Emu chicks and adult brush-turkeys	0.7 x 0.7 x 0.7	2 x 2 x 2	5 x 3 x 2	2	N/A
Emus (other than chicks) and cassowaries	1.5x1 x 1	3 x 3 x 2	10 x 10 x 2	2	N/A

Reptiles

Type of reptile (examples)	Critical care L x W x H (m)	Intermediate care and pre-release L x W x H (m)	Maximum number of individuals	Pond size (as % of total floor area)
Geckos and small skinks (garden skinks)	0.1 x 0.1 x 0.1	0.6 x 0.6 x 0.6	2	N/A
Large skinks (blue-tongue lizards)	0.6 x 0.4 x 0.2	1 x 0.4 x 0.2	2	N/A
Small dragons (bearded dragons)	0.3 x 0.2 x 0.2	0.8 x 0.3 x 0.3	2	N/A
Monitors and large dragons (lace monitors)	1.2 x 1 x 0.6	4 x 3 x 2	2	N/A
Small venomous snakes (death adders) up to 80cm	0.5 x 0.3 x 0.2	0.7 x 0.6 x 0.5	2	N/A
Large venomous snakes (eastern brown snakes) over 80cm	0.6 x 0.4 x 0.4	1.20 x 1 x 0.6	2	N/A
Small pythons (spotted pythons)	0.4 x 0.3 x 0.2	1 x 0.6 x 0.5	2	N/A
Large pythons (carpet pythons)	1.2 x 0.5 x 0.5	2 x1.5 x 1.5	2	N/A
Small freshwater turtles (eastern snake-necked turtles) up to 15cm shell	0.6 x 0.4 x 0.4	1.8 x 0.6 x 0.4	2	50%
Large freshwater turtles (broad-shelled turtles) over 15cm shell	1 x 0.5 x 0.4	2 x 1.2 x 0.9	2	50%

Mammals

Type of mammal (examples)	Critical care L x W x H (m)	Intermediate care L x W x H (m)	Pre-release L x W x H (m)	Maximum number of individuals
Small bats (microbats)	0.3 x 0.2 x 0.3	0.5 x 0.5 x 0.5	5 x 3 x 2	10
Large bats (megabats)	0.8 x 0.6 x 0.6	1 x 1 x 1 (for single animals)	10 x 4 x 2	30
Small dasyurids and rodents (antechinus and mice)	0.3 x 0.2 x 0.2	0.5 x 0.5 x 0.3	1 x 1 x 0.3	4
Large dasyurids and rodents (quolls, phascogales and water rats)	0.5 x 0.3 x 0.5	1 x 1 x 1	3 x 2 x 2	4
Bandicoots, potoroos and bettongs	0.5 x 0.5 x 0.5	1 x 1 x 1	4 x 3 x 2	4
Small macropods (pademelons)	0.7 x 0.7 x 0.5	3 x 2 x 1.5	10x 10 x 2	4
Medium macropods (wallabies and rock-wallabies)	1.5 x 0.8 x 1	4 x 3 x 1.5	20 x 20 x 2	4
Large macropods (grey kangaroos)	1.5 x 0.7 x 1.5	5 x 5 x 2	40 x 20 x 2	4
Small possums and gliders (pygmy-possums and feathertail gliders)	0.3 x 0.2 x 0.5	0.6 x 0.3 x 1	2 x 1 x 2	10
Large possums (ringtail and brushtail possums)	0.5 x 0.5 x 0.8	1 x 1 x 1	3 x 2 x 2	2
Large gliders (greater gliders and sugar gilders)	0.4 x 0.3 x 1	1 x 1 x 1	6 x 3 x 3	6
Koalas	0.7 x 0.7 x 0.7	2 x 1 x 2	4 x 3 x 3	2
Echidnas	0.5 x 0.5 x 0.5	1.5 x 1.5 x 1	5 x 4 x 1	2

Note: Persons and organisations are reminded to refer to **Section 10—Housing standards and guidelines** in the code to ensure wildlife undergoing rehabilitation is housed in a way that prevents injury or escape, minimises stress, maintains safe levels of hygiene and allows natural behaviours.

Carmichael Coal Rail and Offsite Infrastructure Project

Threatened Species Management Plan

QE99106 | 15 July 2013

SINCLAIR KNIGHT MERZ

SKM

Carmichael Coal Mine and Rail Project

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Contents

1. Introduction

1.1 Project overview

Adani Mining Pty Ltd (the Proponent), commenced an Environmental Impact Statement (EIS) process for the Carmichael Coal Mine and Rail Project (the Project) in 2010. On 26 November 2010, the Queensland (Qld) Office of the Coordinator General declared the Project a 'coordinated project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736). The Project was assessed to be a controlled action on the 6 January 2011 under section 75 and section 87 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions include:

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Wetlands (Ramsar) (sections 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- The Great Barrier Reef Marine Park (GBRMP) (sections 24B & 24C).

The Qld Government's EIS process has been accredited for the assessment under Part 8 of the EPBC Act in accordance with the bilateral agreement between the Commonwealth of Australia and the State of Queensland.

The Proponent prepared an EIS in accordance with the Terms of Reference (ToR) issued by the Qld Coordinator-General in May 2011 (Qld Government, 2011). The EIS process is managed under section 26(1)(a) of the *State Development and Public Works Act 1971* (SDPWO Act), which is administered by the Qld Government's Department of State Development, Infrastructure and Planning (DSDIP).

The EIS, submitted in December 2012, assessed the environmental, social and economic impacts associated with developing a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the northern Galilee Basin, approximately 160 kilometres (km) north-west of Clermont, Central Queensland, Australia. Coal from the mine will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Point of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

- The Project (Mine): a greenfield coal mine over EPC 1690 and the eastern portion of EPC 1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure.
- The Project (Rail): a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
  - Rail (west): a 120 kilometre (km) dual gauge portion running west from the Mine site east to Diamond Creek
  - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah
  - Quarries: the use of five local quarries to extract quarry materials for construction and operational purposes
  - Offsite infrastructure.

1.2 Proponent

Adani Mining Pty Ltd (Adani) is the Proponent of the Project. Adani is an Australian subsidiary of Adani Enterprises Limited, a company based in Ahmedabad, India. Adani Enterprises Limited has diverse interests in global trading, development and operation of ports, inland container terminals, establishment of special economic zones, oil refining, logistics, gas distribution, power generation, transmission and trading.

Adani established in Australia in mid-2010 with the intent of exploring for, mining, and exporting coal resources. Accordingly, Adani initially purchased the right to seek a mining lease application (being MLA70441) over exploration permit for coal (EPC) 1690 and then secured similar rights to the eastern and northern parts of EPC1080 in December 2011. This was the initiation of development of the Project. Adani Abbot Point Terminal Pty Ltd (Adani APT), also an Australian subsidiary of Adani Enterprises Limited, has purchased the lease of Abbot Point Coal Terminal 1 and is seeking to develop Abbot Point Coal Terminal 0 as part of their overall program for export coal.

1.1 Purpose and scope

This Threatened Species Management Plan (TSMP) has been developed to facilitate appropriate management of species listed as Endangered, Vulnerable or Near Threatened (EVNT) under the EPBC Act and/or the Queensland *Nature Conservation Act 1992* (NC Act) that have been confirmed or considered likely to occur within the Project (Rail) study area. Species occurring or likely to occur with the study area for the Project (Rail) have been identified from ecological assessments undertaken for the Environmental Impact Statement (EIS) (GHD, 2012a; GHD, 2012b; CDM Smith, 2012a; GHD, 2013).

The TSMP provides species specific information, identifies potential impacts from the Project (Rail) and recommends appropriate management measures to help avoid, mitigate and manage potential impacts on EVNT species during and after habitat disturbance required for the Project (Rail).

A separate Species Management Program (SMP) that covers species listed as least concern and special least concern wildlife under the NC Act has been prepared by Adani. This includes 'colonial breeders' and migratory bird species listed under selected international agreements.

This TSMP applies to the construction and operational phases of the Project (Rail) components outlined in **Section 1.2.1** and **1.2.2**.

1.2 Project (Rail) description

A detailed description of the Project (Rail) is provided in Section 2 of the EIS (GHD 2012e). Main components relevant to this SMP are summarised below.

1.2.1 Location and components

The Project (Rail) alignment is located within a nominal 95 metre (m) wide corridor that runs from the terminal facilities within the boundary of the Mine to connect with the Wotonga Blair Athol Branch Railway of the existing Aurizon Goonyella Coal Rail System south of Moranbah (location of rail alignment is shown in **Appendix A**. The alignment is approximately 189 km long and runs west to east. The Project (Rail) sits wholly within the Isaac Regional Council Local Government Area.

The Project (Rail) includes all project components necessary for the construction and operation of the greenfield rail system between the Mine site and the junction with the Goonyella rail system. It comprises of the following rail infrastructure:

Located within the 95m rail corridor:

- terminus facilities
- track (including earthworks, structures and track)

- passing loops
- signalling and communications

Located outside the 95m rail corridor:

- maintenance facilities (rolling stock and track)
- construction camps
- laydowns
- construction depot
- concrete batching plants
- turning circle
- bridge laydown
- track laydown
- quarries

The Project (Rail) is proposed to be delivered in two separable portions, namely Rail (west) and Rail (east). The Rail (west) portion is designed to accommodate a dual gauge (i.e. narrow gauge and standard gauge) with a capacity up to 100 Mtpa. The Rail (east) will be a narrow gauge track with capacity assessed at 60 Mtpa.

The Project (rail) will cross eighty-eight waterway crossings, including 12 major waterways. A standardised 15 or 20 m bridge span will be adopted for major waterway crossings. The Project (Rail) will also cross six dedicated public road reserves (constructed and unconstructed), three stock routes and four easements. Three treatment options will be adopted for the rail crossings. These options include grade separation (rail under road or rail over road), at grade active control (level crossings with active controls, i.e. flashing lights and sounds) or at grade passive control (level crossings with passive controls, i.e. signs and line markings). One road, Moray Carmichael Road will be realigned to run parallel to the rail line.

1.2.2 Offsite infrastructure

The Project (Rail) also encompasses the following offsite infrastructure:

- worker accommodation and airport comprising a construction camp (Q4, 2013) and initial mine operations accommodation (2014) as part of a master planned community
- light industrial precinct to facilitate services such as a fuel farm, rail siding, freight unloading terminal
- water infrastructure comprising a bore network (construction and short-term provision):
  - North Creek
  - Eight Mile Creek
  - Obungeena Creek
- 2 GL dam
- Carmichael Road.

1.2.3 Construction

It is expected that construction of the Project (Rail) will commence in the early to mid 2014 for a period of approximately two years. Construction stages and activities include:

- site preparation including site clearance, construction camp establishment, installation of temporary and permanent fencing, installation of drainage and water management controls and construction of site access

- civil works including bulk earthworks, black soil treatment, construction of cuts and embankments, installation of permanent drainage controls, construction of temporary haul roads, establishment of concrete batching plants, bridge and water course crossing construction and development of quarries and borrow areas
- track works including installation of the rail, signalling infrastructure and maintenance infrastructure.

The construction schedule currently indicates that construction activities in the first year are largely concerned with the undertaking of civil works (earthworks and structures), such as the establishment of watercourse crossings. Yard works (i.e. maintenance yard, flash butt welding yard) are also scheduled during this period. Earthworks are planned to commence in 2014 and continue through to 2015. Track laying, followed by ballasting and tamping, will commence in 2014/15 and is scheduled for completion in 2016. The grade separation treatment at the Gregory Development Road is scheduled to commence in 2014. Passing loops will be constructed progressively in line with coal production and the requisite increased rail capacity required. To facilitate the Project (Mine) five passing loops will be required to be operational by 2018. A total of eight passing loops will provide sufficient operational capacity through to Project (Mine) peak production and transport of 60 Mtpa.

Quarries will be required to source construction materials for the Project (Rail). Five sites have been proposed as potential locations for extracting construction material. These include Disney, North Creek, Moray Pit, Back Creek, Borrow 7 and (location of quarries is shown in **Appendix A**).

Three temporary construction camps will be developed for the Project (Rail). The rail construction camps are located across the alignment with two camps located along the SP1 and one camp located in the SP2 (location of construction camps is shown in **Appendix A**. Access roads will be constructed along the rail alignment from the closest road intersection to the camp sites.

1.2.4 Operation

In addition to the ongoing operation of the Project (Rail) components, track maintenance will be required, including:

- routine maintenance
- major periodic maintenance
- emergency response.

1.2.5 Decommissioning and rehabilitation

Decommissioning of the Project (Rail) will most likely occur after the closure of the Project (Mine), unless in use by third parties.

1.3 Study area

The Project (Rail) study area for the ecological assessments comprised:

- rail - 95 m wide corridor encompassing the SP1 and SP2 rail alignments, and additional temporary infrastructure areas (i.e. laydown areas) and temporary construction camps outside the rail corridor (GHD, 2012b)
- five quarry locations – North Creek, Moray Pit, Back Creek, Borrow 7 and Disney Quarry (CDM Smith, 2012a)
- offsite infrastructure – worker accommodation and airport, light industrial precinct, water infrastructure and Carmichael Road (GHD, 2013).

1.4 Applicable species

This TSMP applies to threatened species listed as EVNT under the EPBC Act and/or NC Act that have been confirmed or considered likely to occur within the Project (Rail) study area. Species occurring or likely to occur with the Project (Rail) study area have been identified from the terrestrial ecological studies undertaken for the EIS and SEIS (i.e. GHD, 2012a; GHD, 2012b; GHD, 2012c; CDM Smith, 2013a; CDM Smith, 2013b; GHD, 2013). Applicable species are listed in **Table 1-1** and includes a total of 12 species (two reptiles, eight birds and two mammals). This includes only fauna species; no threatened flora species were identified in the Project (Rail) study area or are considered likely to occur.

Table 1-1 Species included in the Threatened Species Management Plan

Common Name	Scientific Name	Conservation Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
Reptiles					
Ornamental Snake	*Denisonia maculata*	Vulnerable EPBC Act and NC Act	Likely – preferred habitat occurs in the study area	Confirmed – located in the southern section of Borrow 7	Confirmed – two individuals recorded in the study area - one in open woodland with some brigalow and the other under litter in gidgee/brigalow woodland in the northern part of the study area
Yakka Skink	*Egernia rugosa*	Vulnerable EPBC Act	May – potential habitat recorded in the study area	Potential – potential habitat recorded in the study area	Likely – preferred habitat occurs in the study area
Birds					
Black-chinned Honeyeater	*Melithreptus gularis*	Near Threatened NC Act	Not recorded	Not recorded	Likely – preferred habitat occurs in the study area
Black-necked Stork	*Ephippiorhynchus asiaticus*	Near Threatened NC Act	Likely – preferred habitat occurs in the study area	Confirmed – an individual was observed on a large farm dam	Confirmed – observed at farm dams within the study area
Black-throated Finch (southern)	*Poephila cincta cincta*	Endangered EPBC Act and NC Act	Likely – preferred habitat occurs in the study area	Potential – has been confirmed at the mine and rail alignment and potential habitat is located on the quarries	Confirmed – a single individual was observed in the south-western corner of the study near a dam
Cotton Pgymy-goose	*Nettapus coromandelianus*	Near threatened NC Act	Likely – preferred habitat occurs in the study area	Confirmed – a flock of 30 individuals was observed on a large farm dam south-east of Borrow 7	Confirmed – observed at farm dams within the study area
Grey Falcon	*Falco hypoleucos*	Near Threatened	Likely – preferred	Not recorded	Not recorded

Common Name	Scientific Name	Conservation Status	Likelihood of occurrence within Project (Rail) study area		
			Rail	Quarries	Offsite infrastructure
		NC Act	habitat occurs in the study area		
Lewin's Rail	*Lewinia pectoralis*	Near Threatened NC Act	Not recorded	Not recorded	Confirmed – species was recorded within the study area
Square-tailed Kite	*Lophoictinia isura*	Near Threatened NC Act	Not recorded	Not recorded	Likely – preferred habitat occurs in the study area
Squatter Pigeon (southern)	*Geophaps scripta scripta*	Vulnerable EPBC Act and NC Act	Confirmed – observed in open, grassy woodlands in the study area, also a pair were observed in an Acacia woodland in the western section of the rail alignment	Confirmed – a pair were observed in a grassy eucalypt woodland on Moray Pit	Confirmed – two individuals were observed directly adjacent the study area and other were heard calling in woodland located within the study area
Mammals					
Koala	*Phascolarctos cinereus*	Vulnerable EPBC Act and Special Least Concern NC Act	Likely -preferred habitat occurs in the study area	Confirmed – scratches consistent with Koalas were observed at Disney Quarry and Moray Pit	Likely – preferred habitat occurs in the study area
Little Pied Bat	*Chalinolobus picatus*	Near Threatened NC Act	Confirmed – recorded in three (3) separate locations along the rail alignment in forest habitat adjacent to the Belyando River and Diamond Creek	Potential – potential habitat recorded in the study area	Likely – preferred habitat occurs in the study area

Species profiles (description, known distribution, habitat, breeding, feeding, status, threats and distribution within the study area) are provided in threatened species management plans in **Appendix B**.

1.5 Terms of approval

Adani will finalise this plan in consultation with DSEWPaC and Queensland Department of Environment and Heritage Protection (DEHP). Following approval of the TSMP by DSEWPaC and DEHP, Adani and any of its employees, contractors or agents would be authorised to operate under the TSMP.

1.6 Legislative framework

1.6.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas.

Relevant sections of the EPBC Act include:

1) Part 3, Division 1: Requirements relating to Matters of National Environmental Significance (MNES).

Under the EPBC Act, any action that has, or is likely to have a significant impact on a MNES (known as a controlled action under the Act) may only progress with the approval from the Minister of Sustainability, Environment, Water, Population and Communities under Part 9 of the EPBC Act.

The EPBC Act identifies nine MNES:

i. World Heritage Properties.

ii. National Heritage Places.

iii. Wetlands of International Importance (Ramsar wetlands).

iv. Nationally listed threatened species and ecological communities.

v. Listed migratory species.

vi. Commonwealth marine areas.

vii. Great Barrier Reef Marine Park

viii. Nuclear actions (including uranium mining)

ix. Protection of water resources from coal seam gas development or large coal mining development

The terrestrial ecological studies undertaken for the Project (Rail) identified a number of threatened and migratory species which have potentially suitable habitat in the Project (Rail) study area.

1.6.2 Nature Conservation Act 1992

Under the NC Act, all native plants and most native animals are protected. The *Nature Conservation (Wildlife) Regulation 2006* lists the flora and fauna species considered extinct in the wild, endangered, vulnerable, near threatened, least concern, international and prohibited. It states the declared management intent and the principles to be observed in any taking of or destruction for each group.

Under Section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006*, it is an offence to tamper with an 'animal breeding place' other than in accordance with an approved Species Management Program (SMP) or under a Damage Mitigation Permit. An 'animal breeding place' is defined in the *Nature Conservation (Wildlife Management) Regulation 2006* as follows:

> ***animal breeding place*** *- of an animal, means a bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring.*

DEHP offers a generic SMP, which entities can operate under for works tampering with animal breeding places. The generic SMP contains a number of conditions with which works are to comply and excludes interfering with animal breeding places associated with certain species, including species listed as extinct in the wild, endangered, vulnerable and near threatened, as well as special least concern or least concern colonial breeders as defined below:

i. Special least concern animals (such as koala, echidna, platypus and migratory bird species as defined by CAMBA, JAMBA or Bonn)

ii. Least concern (as listed in the *Nature Conservation (Wildlife) Regulation 2006*) and are colonial breeders and therefore whose broader populations are at greater risk from the impacts of events at a single location.

Where interfering with animal breeding places associated with extinct in the wild, endangered, vulnerable and near threatened species, special least concern species or least concern colonial breeders species DEHP's generic SMP does not apply and a separate threatened species specific SMP is required.

2. Assessment and impacts

2.1 Assessment

2.1.1 Rail corridor

An ecological assessment of the Project (Rail) study area was completed for the preparation of the EIS. The study area comprised the rail corridor (95 m wide corridor encompassing the SP1 and SP2 rail alignments) and additional temporary infrastructure areas (i.e. laydown areas) and temporary construction camps outside the rail corridor (GHD, 2012b).

Terrestrial fauna surveys of the study area were conducted during May 2011 (autumn survey) and September 2011 (spring survey). Three survey types were used. During the May 2011 survey a total of two comprehensive surveys, 12 rapid site assessment surveys and a number of opportunistic surveys were conducted. During the September 2011 ten rapid site assessment surveys and a number of opportunistic surveys were conducted. Comprehensive surveys were not conducted during the September 2011 survey. Details of survey techniques for each survey type are described in **Table 2-1**.

Table 2-1 Details of Survey techniques

Comprehensive Survey	Rapid Site Assessment surveys	Additional Sites Surveys
• Trapping: Elliot type A, cage traps, funnel traps and pit falls • Remote camera trap • Habitat assessment • Opportunistic search for wildlife traces • Standardised (20 min) bird survey • Active herpetofauna search • Anabat detector • Standardised spotlighting • Call playback for frogs and owls	• Habitat assessment • Opportunistic search for wildlife traces • Standardised (20 min) bird survey • Active herpetofauna search • Some sites also had: - Anabat detector - Standardised spotlighting - Call playback for frogs and owls - Remote camera trap - Water body watch	• Opportunistic search for wildlife traces • Remote camera trap • Anabat detector

Targeted searches were conducted for the Brigalow Scaly-foot (*Paradelma orientalis*), Ornamental Snake (*Denisonia maculata*), Dunmall's Snake (*Furina dunmalli*) and Yakka Skink (*Egernia rugosa*). Targeted searches included targeting specific microhabitats such as brigalow-gilgai formations, grass tussocks, sandstone slabs and cracking black clays. The targeted searches also included searches for the distinctive communal scat piles of the Yakka Skink.

2.1.2 Quarries

Fauna surveys for species of conservation significance were conducted at the five quarry locations (CDM Smith, 2013a). The quarries surveyed were:

- North Creek
- Moray Pit
- Back Creek
- Borrow 7
- Disney Quarry

These surveys were conducted between 29 January and 2 February 2013. The survey methodology consisted of rapid habitat value assessments, diurnal herpetofauna searches and continuous fauna observations for scats, tracks, feeding remains and other signs.

An additional Koala survey was conducted between 11 and 13 March 2013. This survey effort was focused on the Disney Quarry and Moray Pit. The methodology used for the koala survey consisted of dividing each site into transects and two observers walking the transect 15m apart using binoculars to assist in observations. This method was conducted on the Disney Quarry during the morning and afternoon and on the Moray Pit late morning and afternoon. In addition to transects, a five-hour spotlighting survey was conducted on the Moray pit only.

All species encountered during the January/February and March surveys were recorded, not just the conservation significant species.

2.1.3 Offsite infrastructure

A late wet season/ early dry season ecological assessment of the offsite Infrastructure study area related to the Project was undertaken (GHD, 2013). This study area comprised the worker accommodation and airport, light industrial precinct, water infrastructure and Carmichael Road. A fauna survey was conducted between 28 April and 6 May 2013. The assessment consisted of two comprehensive fauna sites, 38 rapid fauna assessment sites, opportunistic sites and targeted threatened species surveys. Details of survey techniques for each survey type are described in **Table 2-2**

Table 2-2 Details of survey techniques for offsite infrastructure

Comprehensive Survey	Rapid Site Assessment surveys	Other additional areas
• Trapping: Elliot type A, cage traps, funnel traps and pit falls • Habitat assessment • Opportunistic search for wildlife traces • Three standardised (20 min) bird survey • One hour of active herpetofauna search • One night minimum Anabat detector • Standardised spotlighting • Call playback for frogs and owls	• Habitat assessment • Opportunistic search for wildlife traces • One standardised (20 min) bird survey • 30 mins of active herpetofauna search Some sites also had: • One night minimum Anabat detector • Standardised spotlighting • Call playback for frogs and owls • Remote camera trap • Waterbody watch	• Remote camera trap • Waterbody watch • Opportunistic search for wildlife traces

Threatened species targeted searches were also conducted throughout the study area for Brigalow reptiles (Ornamental Snake and Yakka Skink), Black-throated Finch (*Poephila cincta cincta*), Australian Painted Snipe (*Rostratula australis*), Squatter Pigeon (*Geophaps scripta scripta*), Red Goshawk (*Erythriotriorchis radiatus*) and Koala (*Phascolarctos cinereus*).

2.1.3.1 Brigalow reptiles targeted survey

Targeted surveys for Ornamental Snake and Yakka Skink were carried out using methods recommended in the Draft Referral guidelines for the nationally-listed Brigalow Belt reptiles (DSEWPaC, 2011) and involved in the following:

- A total of 21 hours of diurnal searches (i.e. searching suitable microhabitats, turning woody debris and rocks, raking the soil surface and leaf litter beneath trees and peeling bark) was undertaken in suitable habitats to look for reptiles or their sloughs. These surveys were undertaken in the coolest part of the day.

- A total of 24 hours of spotlighting was undertaken in suitable habitats across the study area. Spotlighting was undertaken between dusk and midnight, targeting water inundated gilgais, wetlands, riparian habitats and adjacent suitable environments.
- Comprehensive trapping (including pitfalls, funnel trapping, Elliott trapping) was undertaken in two areas of suitable habitat within the study area.

2.1.3.2 Black-throated Finch and Australian Painted Snipe targeted survey

Targeted surveys for Black-throated Finch were carried out using methods recommended in the Background Paper to the Significant impact guidelines for the endangered black-throated finch (southern) (DSEWPaC, 2009) and involved the following:

- A total of 23 person hours were spent undertaking waterbody watches at 20 natural and artificial waterbodies across the study area. Waterbody watches were undertaken at dawn, midday and dusk by two teams. In addition, 14 remote cameras were deployed at waterbodies and left for six days and nights, recording a total of 144 hours per waterbody.
- A total of 15 person hours were spent undertaking bird surveys at 40 rapid assessment sites across the study area. Habitat characteristics important for the Black-throated Finch (i.e. presence of native grasses) were recorded during habitat assessments undertaken across the study area.
- Wherever suitable habitat was observed (i.e. vegetated waterbodies), targeted searches for nests and birds were undertaken within a 600 m radius of waterbodies within the study area with an effort of at least one hour/ha of suitable habitat found.
- Searches for the Australian Painted Snipe were undertaken during the waterbody watches required for the Black-throated Finch.

2.1.3.3 Koala targeted survey

Targeted surveys for Koala were carried out using techniques recommended in DSEWPaC's Interim Koala Referral Advice for Proponents and involved searches for evidence of koalas from scats and scratch marks, as well as the evaluation of habitat suitability via the identification of primary and secondary food trees within the study area. The Spot Assessment Technique (SAT) methodology, developed by Phillips and Callaghan (2011) was employed, wherever evidence of koalas was confirmed.

2.1.3.4 Squatter Pigeon and other threatened birds targeted survey

The targeted survey for Squatter Pigeon and other threatened birds potentially present (i.e. Red Goshawk) involved the following:

- combination of 320 km of slow driving surveys undertaken within the study area
- 2,016 hours of remote camera observations (with cameras set at 14 water-bodies)
- 44 hours of water-body watches and 15 person hours of bird surveys were used to search for the Squatter Pigeon and other threatened bird species potentially present (such as the Red Goshawk).

2.2 Impacts

The EIS (GHD, 2012a) identified a number of potential direct and indirect impacts from the Project (Rail) following the ecological assessments.

2.2.1 Construction phase impacts

Potential impacts to terrestrial and aquatic ecology values associated with the construction phase of the Project (Rail) were summarised into the following four broad categories:

- clearing of vegetation

- disturbances to watercourses and waterbodies
- increased anthropogenic activity (i.e. construction activity) leading to disturbance (i.e. habitat degradation, behavioural disruption, fauna injury and mortality)
- introduction of weed and pest animal species.

The impacts of each of the four categories above are summarised below.

2.2.1.1 Clearing of vegetation

Although the total extent of vegetation clearing required for the Project (Rail) was minimised in the design phase, residual impacts include:

- Loss of habitat (roosting, shelter, foraging and breeding) for fauna from clearing of vegetation for construction of the Project (Rail). Preliminary calculations state that approximately 1,868 ha of vegetation would be cleared encompassing the following vegetation community/fauna habitat types (areas impacted will be refined with detailed design):
  - 78 ha of eucalypt open woodland
  - 47 ha of *Acacia* woodland or forest
  - 35 ha of brigalow shrubland to open forest
  - 4 ha of eucalypt and *Acacia* mixed woodland or forest
  - 65 ha of open woodland fringing watercourses and on flood plains
  - 137 ha of native pastures or grasslands
  - 1,502 ha of open cleared land and regrowth
- two dams; 12 major and 76 minor mapped watercourses. Degradation of habitat adjacent to and downstream of cleared areas. Edge effects may occur where previously intact remnant vegetation is exposed to distinct ecotones associated with construction or infrastructure. Clearing of vegetation will affect adjacent habitat through temporary, localised increases in noise, vibration, light and dust from construction works and through potential introduction and/or spread of weeds and pest animals.
- Habitat fragmentation and reduction in connectivity. Habitat fragmentation from construction of the rail corridor may reduce the capacity of some less mobile fauna to move within and between habitats.
- Fauna mortality. Construction activities involved in the clearing of vegetation, including the use of vehicles and machinery, have the potential to lead directly to mortality of fauna. Arboreal and ground fauna are particularly at risk, especially those that roost in hollows, or shelter beneath rocks, logs and bark.

2.2.1.2 Disturbances of surface watercourses and waterbodies

Twelve (12) major and approximately 76 minor watercourse crossings have been identified along the rail corridor (see Section 5.3.1 of the EIS for watercourse crossing details) as well as two farm dams. Impacts on aquatic and riparian habitat from construction of the Project (Rail) include:

- Loss of aquatic and riparian habitat associated with the watercourse crossings and the two farm dams.
- Degradation of aquatic and riparian habitat. Construction works in close proximity to watercourses/waterbodies have the potential to disturb bed and bank substrates affecting water quality and surface flows. This may affect the quality of the surface water for aquatic fauna.
- Aquatic fauna mortality. Construction activities within or adjacent to watercourses/waterbodies have the potential to injure aquatic fauna.

2.2.1.3 Increased anthropogenic activity leading to disturbance

Habitat degradation, behavioural disruption, injury and mortality may arise as a result of increased vehicular movements and construction activities within the construction footprint. Potential ecological impacts include:

- Fauna behavioural disruption associated with habitat degradation. Construction activities at and near the construction zones may disrupt local fauna behaviour, largely as a result of increased exposure to light, noise, dust, vehicles and people. These disruptions may be direct (i.e. increased predation due to noise or increased prey detectability) or indirect (i.e. habitat degradation reducing available resources). Furthermore, human settlements in the form of construction camps have the potential to facilitate increases in the populations of pest animals.
- Fauna mortality. General vehicle and machinery movements have the potential to lead to fauna injury or death. Open pits and trenches in the construction zones are also a hazard for fauna.
- Change in fire regime and risk of fire. Increased human activity has the potential to alter the natural fire regime (i.e. welding and similar activities could cause bushfire incidents which can result in significant mortality of native fauna).

2.2.1.4 Introduction of weed and pest animal species

Increased access to construction zones and associated construction activities such as vegetation clearing and soil disturbance can facilitate the introduction and spread of weeds and pest animals. Weeds and pest animals can have adverse impacts on the fauna diversity of a region and disrupt ecosystems by outcompeting or predating on native species.

2.2.2 Operations phase impacts

Potential impacts to terrestrial and aquatic ecology values associated with the operation phase of the Project (Rail) were summarised into the following four broad categories:

- barrier to movement
- disturbance to watercourses and waterbodies
- increased anthropogenic activity leading to disturbance
- introduction of weed and pest animal species

The impacts of each of the four categories above are summarised below.

2.2.2.1 Barrier to movement

The Project (Rail) will create a permanent linear barrier across the landscape for fauna movement. Although the land surrounding the Project has been subject to land clearing, important wildlife corridors have been retained throughout the study area. Fauna mortality as a result of vehicle strikes and other operational activities is also likely to have an adverse impact on native fauna values within the Project (Rail) footprint. These barriers to movement can affect fauna through:

- Habitat fragmentation. Railway operations may reduce the ability for fauna to disperse across the landscape, particularly where remnant vegetation that provides corridors for fauna movement (i.e. riparian corridors) are intersected, by creating a permanent linear barrier. Habitat fragmentation also has the potential to decrease connectivity, introduce edge effects and reduce the size of habitat patches.
- Fauna mortality. The main risk to fauna from the operational phase of the Project (Rail) relates predominantly to train and maintenance vehicle strikes.

2.2.2.2 Disturbance of surface watercourses and waterbodies

The operational phase of the Project (Rail) has the potential for on-going impacts to watercourses and waterbodies located within and downstream of the Project (Rail) footprint. Potential impacts include:

- Change in aquatic habitat availability and/or suitability for terrestrial and aquatic species. Minor, localised runoff and sedimentation may occur throughout the operational life of the project which may reduce water quality and introduce pollutants to waterbodies.
- Changes to floodplain hydrology. The Project (Rail) footprint is typically located in a low gradient catchment with extensive floodplains (railway crosses 12 major and 76 minor watercourses). Extensive flooding is possible and the railway may, therefore, create a barrier to the flow of water. This may impact downstream locations and species dependent on floodplain processes, such as wetland birds.

2.2.2.3 Increased anthropogenic activity leading to disturbance

Cattle grazing is the predominant land use in the surrounding landscape of the Project (Rail). The Project (Rail) will change the land use of the study area and immediate surrounds. Most notably, habitat fragmentation will occur and faunal disturbance is likely due to operation of the railway. To a lesser extent, increased human activity from staff involved in the operation of the railway will increase along the rail alignment. Potential impacts include:

- Fauna behavioural disruption. Train operations and track maintenance at and near the disturbed areas may disrupt local fauna behaviour, largely as a result of increased exposure to light, noise, dust, vehicles and people. These effects may be direct or indirect, as in **Section 2.2.1.3**. It is not proposed that the railway is lit, except for the balloon loop (within the mining lease) and maintenance facility. Noise/dust generated through operations are predicted to be within operational limits. Noise and dust created by activities, such as maintenance, will be localised to the area of activity and be short in duration.
- Habitat degradation. Coal being transported along the railway could emit dust which may affect terrestrial and aquatic habitat where it settles.
- Changes to fire regime. Increased human activity may alter the fire regime e.g. the rail and infrastructure corridor may act as a fire break and consequently reduce the extent of fire and in turn increase the fuel load which would increase the fire risk for the region. The potential for accidentally-lit fires is potentially increased through sparks from train operations. The incidence of regulated ‘management burns’ may also change in frequency. Accidental or uncontrolled fires have the potential to negatively impact upon vegetation (and habitat) within, and adjacent to, the rail and infrastructure corridor in particular.

2.2.2.4 Introduction of weed and pest animal species

Increased movement of people, vehicles, machinery, vegetation waste and soil may facilitate the spread of weeds and pest animals. The introduction of weeds and pest animals in the rail and infrastructure corridor may lead to increased competition for resources, increased predation and habitat degradation.

3. Management

3.1 General management actions

3.1.1 Construction

Management and mitigation measures proposed in the EIS (GHD, 2012a) to reduce impacts on terrestrial habitat and fauna within the construction footprint and surrounding adjacent landscape include:

- Locate where possible temporary and permanent infrastructure within previously disturbed/degraded areas and/or cleared, non-remnant land to avoid remnant vegetation (in particular endangered and of concern REs).
- The construction footprint will be reduced in environmentally sensitive areas, particularly at river and creek crossings, to limit the area of habitat being disturbed.
- All vegetation clearing will be supervised by a qualified fauna spotter-catcher. Pre-demarcated habitat features will be thoroughly checked by fauna spotter-catcher prior to clearing, for the presence of wildlife.
- Prior to vegetation clearing, trees and habitat features such as hollows and log piles that may be used by fauna for nesting or shelter will be marked and where possible salvaged and placed in adjacent, intact habitat areas. Where this is not possible, the loss of habitat features will be supplemented in adjacent habitat areas with artificial habitat (i.e. nest boxes, artificial water sources).
- A fauna species relocation plan will be developed to facilitate relocation of fauna individuals according to species requirements prior to the commencement of clearing (particularly if conservation significant fauna species are encountered during clearing activities).
- A fauna mortality register will be maintained to document the location and frequency of mortality and the fauna species most susceptible to injury and death, to enable on-going modifications to fauna conservation management strategies where necessary.
- Vegetation clearing will be undertaken in a sequential manner to allow more mobile fauna species the opportunity to disperse away from cleared areas and clearing activities
- As soon as possible after cleared areas are no longer required (areas outside of the rail corridor), suitable rehabilitation will commence using flora species of local provenance and species associated with the cleared regional ecosystems. Management of previously disturbed land should occur in accordance with a Project Rehabilitation Plan proposed to be developed for the Project (Rail). This plan should provide key performance indicators and detail how the disturbed land will be managed and rehabilitated, including (but not limited to) details regarding seed collection, restoration of soil structure, weed management, flora regeneration and landscape design.
- Vegetation clearing activities will, where possible, seek to avoid alteration to waterways such that the impacts to water quality and downstream flows are minimised to the greatest extent possible. Management of erosion and sedimentation in and adjacent to cleared areas must be undertaken in accordance with a Project Erosion and Sediment Control Plan proposed to be developed for the Project (Rail).
- Temporary fencing should be erected around construction zones to exclude fauna and livestock.
- Where fencing is required around cleared areas, it will be designed such that fauna can move through it to retain landscape permeability where possible (excluding those instances where fenced areas seek to protect fauna from construction zones, i.e. trains, trenches, human contact). Consideration should be given to not using barbed wire on the top strand of wire fences or suitable fencing to maintain a level of landscape permeability.
- All vehicles and plant must adhere to site rules relating to speed limits. Speed limits will be restricted, and clearly signposted so as to minimise the potential for road kill.
- Reduce the number of construction vehicles mobilising to and from site daily – retain vehicles within the construction zone and transfer personnel by means of bus to and from the work front daily to reduce the exposure for animal strike in areas away from the construction footprint.

- Site inductions for all staff are to include education sessions regarding the local fauna that may be present on the site and protocols to be undertaken if fauna are encountered
- Work areas will be inspected daily for fauna that may have become trapped before work commences each day, and fauna present to be relocated or moved.
- If any pits/trenches are to remain open after daily site works have been completed, they will be fenced, covered by an impenetrable barrier, or if possible, fauna ramps should be put in place to provide a potential means of escape for trapped fauna.
- Limit lighting to work areas and employ directional lighting where lighting is required in areas near remnant vegetation, to avoid disturbance to sensitive habitat (i.e. watercourses and wetlands/ox-bows).
- Ensure all construction machinery and plant and equipment is appropriately serviced and maintained to minimise machinery noise where possible.
- Dust suppression during construction in cleared areas and on unsealed roads at suitably regular intervals, and the use of stabilised surfaces where possible.
- Management of weeds in and adjacent to cleared areas in accordance with a Project Weed and Pest Management Plan proposed to be developed for the Project (Rail). This plan should include details relating to the monitoring, management and where necessary, eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols.
- Management of fauna pest species during construction in and adjacent to cleared areas in accordance with a Project Weed and Pest Management Plan proposed to be developed for the Project (Rail). This plan should include details relating to the monitoring and management of pest animals. Camps and laydown areas to be fenced to prevent encroachment of feral species. Domestic waste material will be appropriately sealed and stored to discourage encroachment by wildlife and feral species.
- Develop and implement a Project Waste and Hazardous Materials Management Plan, which will include waste management and disposal protocols and procedures.
- Implementation of the Project Fire Management Plan that has been developed for the Project to address and minimise fire hazards. Ecological considerations will be incorporated into the development of this plan and response procedures developed.

Management and mitigation measures to reduce impacts on riparian and aquatic habitats from construction of the Project (Rail) include:

- Where possible, construction within rivers and creeks is to be undertaken in the drier periods and ahead of rail construction. This will reduce disturbance and interference to surface flows and subsequent impacts on aquatic habitats.
- Route selection identified watercourse areas (amongst others) as constraints and sought to minimise impacts to watercourses through avoidance, selection of suitable bridge spans or location in narrower crossing areas, crossing of a tributary rather than the main waterbody, etc.
- Avoid and minimise human and vehicle access to river and creek bed and banks. Construction of river/watercourse crossings ahead of rail construction (as far as is possible) will reduce the need for personnel, equipment, machinery and plant to traverse the river/watercourse and limit disturbance to bed and banks.
- Temporary stream or channel diversion may be required to facilitate activities in wet periods. Stream flow is maintained to provide connectivity between aquatic habitats and facilitate aquatic fauna passage.
- Design and layout of the components of the infrastructure will maximise development on existing cleared lands as priority to avoid impacts to the creek bed, banks and riparian areas and the aquatic values that may be provided when inundated (mainly during high water flows).
- Clear, on-ground demarcation of areas to be cleared adjacent to watercourse crossing locations will be undertaken prior to clearing to avoid accidental clearing or stockpiling of cleared vegetation in sensitive areas. Identification of this area for protection where possible will minimise the potential for unnecessary impact to the creek and consequently downstream areas.

- Disturbance to creek banks and control of site runoff from all areas disturbed during construction activities will be managed through the development and implementation of a Project Erosion and Sediment Control Plan. This plan will limit the potential for the degradation of downstream aquatic habitat.
- Design and layout of watercourse crossings will consider the requirement for fish movement including under flow conditions. This will be done in accordance with Department of Agriculture, Fisheries and Forestry guidelines for the design of stream crossings (Cotterell, 1998) for fish passage.
- To avoid mortality of aquatic fauna within farm dams impacted by construction activities, a Fauna Salvage and Relocation Plan will be required. Relocation would require preliminary sampling of dams to identify the native species present, followed by the development of an appropriate salvage plan for approval by the relevant agencies prior to removal of the habitat. The plan will require consideration of the relocated location in terms of suitability and availability of habitat and resources for the community.
- To avoid mortality of aquatic fauna within higher order watercourses (namely, Belyando River, Mistake Creek, Logan Creek and Diamond Creek) construction activities will be undertaken during dry conditions where possible.

3.1.2 Operation

Management and mitigation measures proposed in the EIS (GHD, 2012a) to reduce impacts on terrestrial habitat and fauna during the operation phase of the Project include:

- Rehabilitate and reduce operational areas in the vicinity of watercourse crossings and where possible reinstate riparian habitat below infrastructure.
- Implementation of the Fauna Crossing Strategy that has been developed for the Project. This includes installation of fauna underpasses at targeted locations along the rail corridor that enable the safe crossing of fauna (in particular macropods, quolls and small mammals) across the rail corridor. Fauna underpasses will be colocated with culverts, bridges, particularly in important habitat areas and bioregional corridors (i.e. riparian corridors). For example culverts to facilitate movement of fauna (e.g. incorporation of fauna furniture, allow for natural light through use of grids, rehabilitation of entries and exits, fauna exclusion fencing to guide fauna through the underpass) are advised to be installed where the Project bisects watercourses, drainage lines and remnant vegetation, including the areas mapped as potentially suitable habitat for threatened species which are considered likely to occur. The suitability of culvert size will be a consideration during detailed design of crossing structures. For example, when targeting common fauna such as macropods, larger culverts will encourage use. Monitor the use of underpasses by fauna.
- Install fencing along the rail corridor to restrict fauna movement within and across the rail corridor. Consideration should be given to reducing the chance of fauna mortality by avoiding the use of barbed wire on the top strand of wire fences.
- Incidents of fauna strike and mortality are to be monitored during construction and operation of the rail line.
- Management of weeds in and adjacent to cleared areas in accordance with a Project Weed and Pest Management Plan. This plan will include details relating to the monitoring, management and where necessary eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols.
- Management of fauna pest species in and adjacent to cleared areas in accordance with a Project Weed and Pest Management Plan. This plan should include details relating to the monitoring, management and where necessary eradication of pest animals.
- Lighting is not proposed along the railway with the exception of the balloon loop and maintenance facility which will be lit 24 hours a day. The other areas that are expected to be lit include the construction work front, construction camps, quarries and construction depot. Lighting at the maintenance facility will be shielded to avoid lighting non-operational areas unnecessarily.
- Operation staff and maintenance personnel will remain within the operation footprint and make use of designated access and tracks at all times.
- Coal dust from train operations will be managed by development and implementation of a Project Coal Dust Management Plan.

- Management of fauna pest species in and adjacent to cleared areas in accordance with a Project Weed and Pest Management Plan. This plan should include details relating to the monitoring and management of pest species.
- All plant and equipment brought onto site will be cleaned and weed free. Wash downs between construction areas (as appropriate) will be undertaken during construction and in accordance with landholder agreements.
- Implementation of the Project Fire Management Plan that has been developed for the Project. As well as documenting protocols and actions for preventing accidentally-lit fires, this plan should outline how fuel loads will be monitored and maintained across the Study Area. Ecological considerations will be incorporated into the development of this plan and response procedures developed.

Management and mitigation measures to reduce changes in aquatic habitat availability and/or suitability for terrestrial and aquatic species during operation activities include:

- Ensure all permanent erosion and sediment control devices are functional prior to commencement of railway operation and maintain and repair all devices throughout the life of the Project.
- Current best practice for erosion and sediment control measures will be taken in accordance with the International Erosion Control Association's Best Practice Erosion and Sediment Control Guidelines (2008) to minimise the potential for sedimentation of receiving waters.
- Trains should remain clean and be maintained to minimise the introduction of contaminants such as oil and fuel.
- A Waste and Hazardous Materials Management Plan will be developed and implemented and will include fuel and chemical storage protocols and spill responses.
- Rehabilitate and maintain aquatic habitats and riparian areas in accordance with rehabilitation plans for a period of 1 year post construction.

3.2 Threatened species management plans

Threatened species management plans for applicable species (refer **Table 1-1**) are provided in **Appendix B**. The following information is provided for each species:

- Description
- Known distribution
- Habitat
- Breeding
- Feeding
- Status
- Threats
- Potential distribution within the Project (Rail) study area
- Potential impacts from the Project (Rail)
- Mitigation and management measures
- Monitoring
- Performance indicators
- Corrective actions
- References

Threatened species management actions will be undertaken in the following order:

1) Where possible schedule the clearing to be outside the main breeding season of applicable species.
2) Pre-clearing surveys: the following staged approach to the pre-clearing surveys will be undertaken to minimise impacts on breeding species:
   - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences.
   - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates.
3) Avoidance: where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor.
4) Care: where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer.
5) Relocation: inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. Where possible the inactive breeding structure will be placed at a similar height.
6) Offset: hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision.

All vegetation and habitat clearing will be undertaken in accordance with the survey and clearing procedures outlined for each species group in **Appendix B**.

Threatened species sightings and potential habitat mapping for the Project (Rail) study area from the EIS (GHD, 2012a; GHD, 2012b) is provided in **Appendix C**.

3.3 Responsibilities

Following approval of this TSMP by DSEWPaC and DEHP, Adani would be responsible to oversee implementation of the plan, including that all contractors and agents engaged by Adani for construction and operation of the Project (Rail) comply with its conditions. Adani will likely assign responsibility for implementation of the mitigation and management measures during construction to the construction contractor. The construction contractor would then be responsible for engagement of a suitably qualified ecologist and licenced fauna spotter-catcher (i.e. holding a Rehabilitation Permit issued by DEHP).

4. Monitoring and reporting

4.1 Monitoring

4.1.1 Pre-clearing condition

Fauna surveys undertaken for the EIS have confirmed the location of several threatened species within the study area, namely Ornamental Snake, Black-necked Stork, Black-throated Finch, Cotton Pygmy-goose, Lewin's Rail, Squatter Pigeon, Koala and Little Pied Bat. Where threatened species have been confirmed within and adjacent to the construction footprint, permanent monitoring sites will be established in the known habitat areas.

A monitoring program will be developed and implemented for these species including conducting baseline surveys pre-construction to confirm presence, estimate activity levels and evaluate habitat quality. Survey methodology will be based on relevant DSEWPaC threatened species survey guidelines, including 'Survey guidelines for Australia's threatened reptiles (DSEWPaC, 2011), 'Survey guidelines for Australia's threatened birds' (DEWHA, 2010), 'Survey guidelines for Australia's threatened mammals' (DSEWPaC, 2011), 'Survey guidelines for Australia's threatened bats' (DEWHA, 2010) and 'Interim koala referral advice for proponents' (DSEWPaC, 2012). The timing of the surveys should coincide with the breeding season of the targeted threatened species as these periods are likely to represent peaks in fauna movement and thus higher detection rates.

Pre-clearing surveys will be undertaken 24 hours prior to the commencement of clearing activities within potential habitat located within the construction footprint by a suitably qualified and experienced ecologist to search for threatened species and inform fauna rehabilitation protocols.

4.1.2 During and post-clearing monitoring

All clearing will be supervised by a licensed fauna spotter-catcher. 24 hours prior to the commencement of clearing activities, potential habitat located within the construction footprint (i.e. trees, hollows and habitat features) will be thoroughly checked by the spotter-catcher for fauna, including threatened species. Salvageable habitat features (i.e. hollows and log piles) will be relocated into adjacent habitat. The spotter-catcher will also facilitate the safe rehabilitation of any threatened fauna found into pre-determined suitable relocation sites. The spotter-catcher will record details of any threatened fauna or habitat features that have been relocated (i.e. GPS location, species or habitat relocated, description of relocation site).

A monitoring program will be developed and implemented to assess the success of the mitigation and management measures proposed. This will include:

- Annual monitoring of permanent monitoring sites during and post construction to assess ongoing presence/absence, activity levels and habitat quality, and whether the Project (Rail) is affecting the long-term viability of threatened species. Monitoring methods should follow the DSEWPaC survey guidelines for threatened species. After baseline surveys, monitoring of permanent monitoring sites should be repeated annually during and after construction and for a duration of three years to monitor the impacts from the Project (Rail), after which the need for further monitoring would be reviewed in consultation with DSEWPaC and/or DEHP.
- Monitoring of habitat features (i.e. hollows, logs) that have been relocated into adjacent habitat or artificial habitat (i.e. nest boxes, artificial water sources) that have been installed into adjacent habitat to supplement loss of habitat. Monitoring will be required to determine the usage of relocated/artificial habitat, such as nest boxes by the target species and any maintenance requirements. Methods will involve a visual inspection of each habitat feature to collect data on fauna species occupancy (presence or signs), presence of pest species (i.e. European Bees, Common Myna, Termites), any deterioration of the habitat feature, maintenance required and whether the surrounding landscape has changed. Monitoring should be undertaken 12 months after the installation period followed by a summer or winter census to account for

seasonal variation in the use of the nest boxes. It is proposed that annual monitoring and maintenance be undertaken thereafter for a duration of three years.

- Monitoring of fauna underpasses in the vicinity of known habitat areas to assess use by threatened species. Monitoring methods will be standardised and targeted to the likely threatened species that will utilise the fauna crossing structures. Methods will likely include motion-detecting cameras with infrared flash installed, sand plots, and scat, track and scratch searches. Monitoring will commence six months after installation of fauna underpasses (i.e. Veage and Jones 2007) and will be undertaken annually to coincide with the breeding season of targeted species, for a duration of three years to monitor the effectiveness of the fauna underpasses, after which the need for further monitoring would be reviewed in consultation with DSEWPaC and/or DEHP.
- Monitoring of rehabilitation areas to assess success against rehabilitation criteria using the BioCondition assessment methodology (Eyre et al., 2011). A Project Rehabilitation Plan will be prepared for rehabilitation including rehabilitation methods, key performance criteria and monitoring requirements. Monitoring should commence 1-2 years after establishment. It is proposed that annual monitoring and maintenance be undertaken thereafter for a duration of five years.

It is recommended that an independent audit during construction is undertaken by a third party to demonstrate compliance with the mitigation and management measures proposed (i.e. pre-clear surveys, fauna spotter-catcher present).

4.2 Responsibilities

Baseline surveys and monitoring will be undertaken by a suitably qualified and experienced ecologist. Pre-clearing surveys will be undertaken by a licensed fauna spotter-catcher (or an ecologist if the spotter-catcher does not have adequate fauna survey experience). All fauna relocation will be undertaken by a licensed fauna spotter-catcher (i.e. holding a Rehabilitation Permit issued by DEHP). In the event that an animal is injured and requires care, it will be taken by a licensed wildlife carer.

4.3 Performance indicators

Key performance indicators to measure the success of mitigation and management measures for threatened species will include:

- pre-clearing survey undertaken 24 hours prior to the commencement of clearing and fauna spotter-catcher present during clearing
- no mortalities of threatened species recorded in the fauna register during construction
- monitoring detects no significant decline in threatened species activity levels at permanent monitoring sites
- monitoring detects use of the fauna underpasses by the targeted threatened species
- improvement in measurements of site-based vegetation attributes over-time against target rehabilitation criteria developed for rehabilitation areas.

4.4 Corrective actions

There is the potential for natural variation in threatened species populations for a range of reasons. Further monitoring and/or assessment would be undertaken if absence or decline in activity levels of threatened species is identified as being attributable to the Project (Rail). The monitoring/assessment to determine the cause of the absence/decline and corrective actions would be commenced as necessary, taking into account potential causes such as dry seasons, population fluctuations and other natural variation. Any corrective actions identified would be agreed to by the relevant regulatory authorities (DSEWPaC and/or DEHP) prior to being implemented.

Potential corrective actions could include:

- review monitoring methods, considering further monitoring and/or assessment should there be absence or decline in activity levels of threatened species at permanent monitoring sites
- review location of the fauna underpasses and consider moving and/or adding structures and extending fencing
- check fauna underpasses and associated fauna furniture for damage/blockage and rectify
- investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity
- undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control
- weed and pest control.

4.5 Reporting

A full report of the management actions undertaken in accordance with this TSMP will be provided to the Adani General Manager Environment & Sustainability and the relevant agencies (DSEWPaC and/or DEHP) on completion of the Project (Rail) construction (in stages if applicable). This report will provide details on any threatened species found, relocated, injured or killed during construction, as well as details on the breeding structures (i.e. hollows) removed/relocated, and the artificial breeding structures (i.e. nest boxes) installed to supplement any removed. Reporting will be undertaken by the licensed fauna spotter-catcher and/or suitably qualified ecologist whilst on site during pre-clear surveys and clearing works.

Incidents involving wildlife injury or death will be recorded in DEHP's Fauna Register (**Appendix D**). The completed Fauna Register must be forwarded via email to DEHP within 24 hours of the incident occurring. Contact details for DEHP are located in **Section 5**.

Annual reporting of all baseline and monitoring results will be provided to the Adani General Manager Environment & Sustainability and the relevant agencies (DSEWPaC and/or DEHP) and. The annual report/s will outline:

- monitoring methodology employed
- results of the baseline surveys
- results of the seasonal monitoring events
- assessment of results against baseline data and performance indicators to assess the effectiveness of the mitigation measures
- any modifications required to timing or frequency of monitoring events or monitoring methodology
- corrective actions (including maintenance) that should be implemented in the event that a mitigation measure is deemed ineffective
- comparison of the effectiveness of fauna underpasses for target species.

Reporting will be undertaken by a suitably qualified ecologist engaged for the baseline and post-clearing monitoring.

5. Contact details

5.1 Proponent (Adani)

Hamish Manzi

General Manager Environment and Sustainability

Adani Mining Pty Ltd

Level 30, 10 Eagle Street, Brisbane, QLD 4000

GPO Box 2569, Brisbane, QLD, 4001

Phone: (07) 3223 4800

Email: hamish.manzi@adani.com

5.2 Department of Environment and Heritage Protection

TBC

5.3 Department of Sustainability, Environment, Water, Population and Communities

TBC

5.4 Licensed fauna spotter-catcher

Fauna spotter-catchers will be employed by the construction contractor and will be DEHP licensed (i.e. Rehabilitation Permit).

5.5 Wildlife carers

Central Highlands and Coal Fields Wildlife Care and Rescue

2 Spoonbill Road, Clermont

Phone: (07) 4983 1415

For advice on microbat rehabilitation:

Australian Bat Clinic and Wildlife Trauma Centre (24 hr)

Trish Wimberley

(07) 5563 0333

0418 402 305

5.6 Veterinarians

Clermont Veterinary Surgery

29 Laglan Road, Clermont

Phone: (07) 4983 1172

Moranbah Veterinary Clinic

33 Mills Road, Moranbah

Phone: (07) 4941 7001

6. References

CDM Smith (2013a) *Adani Quarry Permits and Approvals: Fauna Assessment*. 23 May 2013. Report for Adani Mining Pty Ltd.

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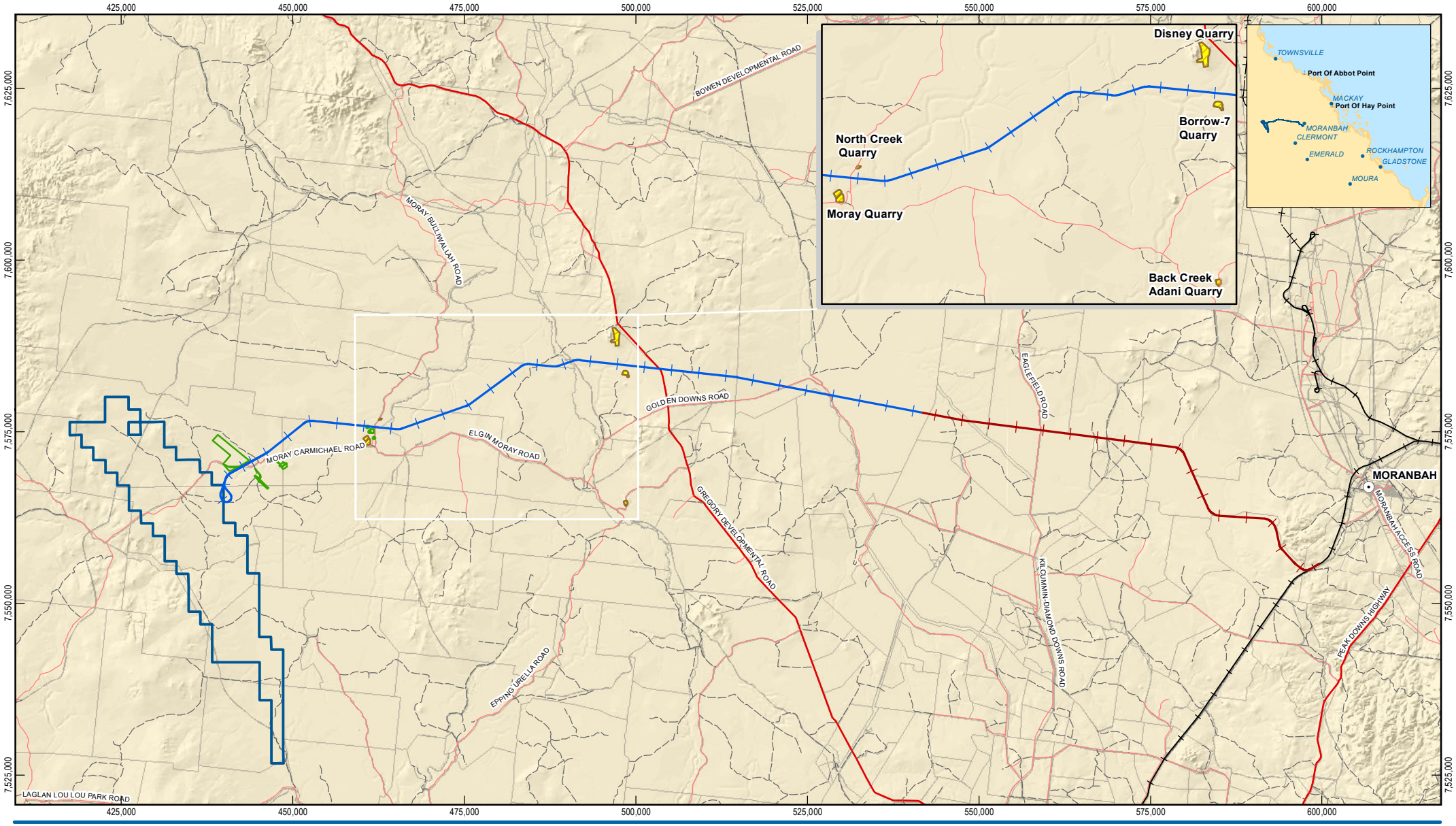
Appendix A. Project (Rail) location



1:750,000 (at A4)

0 5 10 15 20 25

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Existing Railway
- State Road
- Local Road
- Track
- Rail (West)
- Rail (East)
- Mine (Onsite)
- Mine (Offsite)
- Cadastral Parcel
- Quarry
- Mine Footprint

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Species Management Plan

Project Location

Job Number 41-26422
Revision B
Date 14-10-2013

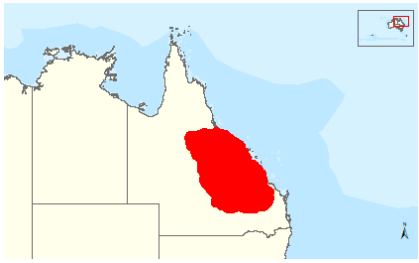
G:\41\26422\GIS\Maps\MXD\0000_Overview\41_26422_0025_rev_b.mxd

Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DNRM: DEM (2008), DCDB (2010), Physical Road Network (2011); DME: EPC1690 (2010), EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Localities, Railways (2007); Adani: Footprint, Alignment, Offsite, Quarries (SP1&2)(2013). Created by: MS

Appendix B. Threatened Species Management Plans

B.1 Ornamental Snake (*Denisonia maculata*)

Threatened Species Management Plan – Ornamental Snake (*Denisonia maculata*)	
Description	A brown, grey-brown or black snake growing up to 50 cm in length with lighter coloured body scales, often with darker streaks/flecks. The crown of the head is darker brown/black with lighter flecks, it has distinctly barred lips, a white/cream belly with dark spots/flecks on the outer edges, and smooth scales (Cogger, 2000).  Source: SKM
Known distribution	The species occurs in the Brigalow Belt North bioregion, where the majority of natural vegetation has been cleared for agriculture, mining and urban development, and has been degraded by overgrazing by stock. This has resulted in a decline in abundance in the past few decades (Cogger et. al., 1993).  Source: DSEWPaC, 2013
Habitat	Ornamental Snake prefers habitat within, or close to, habitat that is favoured by its prey (frogs). Preferred habitat includes woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in Queensland Regional Ecosystem (RE) Land Zone 4, but also on lake margins and wetlands (Agnew 2010 pers. comm.; Brigalow Belt Reptiles Workshop, 2010; Wilson & Knowles, 1988). Gilgai formations are found where deep-cracking alluvial soils with high clay contents occur (Brigalow Belt Reptiles Workshop, 2010). The most common Ornamental Snake habitat is Brigalow (*Acacia harpophylla*), Gidgee (*Acacia cambagei*), Blackwood (*Acacia argyrodendron*) or Coolibah (*Eucalyptus coolabah*)-dominated vegetation communities, or pure grassland associated with gilgais (Brigalow Belt Reptiles Workshop 2010).The most common RE in which this species has been recorded is RE 11.4.3. Other common REs are 11.4.6, 11.4.8 and 11.4.9 (Agnew 2010 pers. comm.; Brigalow Belt Reptiles Workshop, 2010). Ornamental Snakes are nocturnally active, sheltering during the day under fallen timber, rocks, bark and in deep soil cracks. During dry periods, the species typically seeks refuge within soil cracks on gilgai mounds within the habitat area (Brigalow Belt Reptiles Workshop, 2010) (cited DSEWPaC, 2013).
Breeding	A live bearing species producing 3- eleven young during the pre-wet season of September- November (Curtis et al., 2012).
Feeding	The diet of this species consists predominantly of frogs (Cogger, 2000).
Status	Vulnerable under the EPBC Act and the NC Act
Threats	Threats to Ornamental Snake include habitat clearing and fragmentation, altered water quality and hydrology affecting gilgai and wetland habitat, habitat degradation by cattle and exotic weed species, predation by feral species, and consuming Cane Toads. The species is generally not found in areas with high numbers of Cane Toads (Melzer, 2012).

Threatened Species Management Plan – Ornamental Snake (*Denisonia maculata*)	
Potential distribution within Project (Rail) study area	**Rail corridor:** No Ornamental Snakes were detected during the field surveys. However, potential habitat for this species within the project area and broader surrounding landscape exists. The extent of potential habitat for Ornamental Snake in both the study area and the surrounding landscape is shown in **Appendix C.1**. The main limiting factor determining the utilisation of identified potentially suitable habitat by Ornamental Snake is likely to be related to the density of frog populations, which in turn may be driven by the localised availability of frog breeding sites (i.e. standing water associated with gilgais, ephemeral creeks and rivers) (GHD, 2012a). **Quarries**: Within the surveyed quarry sites, preferred habitat for Ornamental Snake is restricted to the low-lying areas of the southern portion of the Borrow 7 investigation area where the species was recorded. In addition, potential habitat is present east of the Borrow 7 investigation area where the drainage line continues and cleared gilgais are present. The more elevated sections of the Borrow 7 investigation area provide less conducive habitat for the species. Riparian habitat adjacent to Back Creek Pit features Brigalow and low-relief gilgais that may also be suitable for the species (CDM Smith, 2013b). **Offsite infrastructure**: Two individual Ornamental Snakes were observed during the assessment of the offsite infrastructure. One individual was observed within an open woodland habitat that contained some brigalow, located in the southern part of the study area. The second individual was observed under some litter in gidgee/Brigalow woodland, located in the northern part of the study area. Potential habitat for Ornamental Snake is shown in **Appendix C.1**.
Potential impacts from Project (Rail)	**Rail corridor**: Vegetation clearing for the construction of the Project (Rail) will impact on 229.5 ha of potential habitat for Ornamental Snake. In general, the construction footprint and surrounding study area are not considered to support an 'important population' of 'habitat critical to the survival' of Ornamental Snake. Thus vegetation clearing (and associated impacts) is not considered to constitute a significant impact to Ornamental Snake (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increased in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: An Ornamental Snake was recorded along a partially vegetated drainage line south of the Borrow 7 Quarry investigation area. Habitat south of Borrow 7 Quarry is considered 'important habitat' under the Draft referral guidelines for the nationally listed Brigalow Belt reptiles (DSEWPaC, 2011). Suitable habitat was also identified within riparian habitat along Back Creek adjacent to the Back Creek Quarry. The drainage line along which the Ornamental Snake was recorded is not fully vegetated along its entirety however suitable habitat for the species (open-forests to woodlands associated with gilgai formations and wetlands) may also be cleared habitat under the guidelines. It is therefore likely that four or more hectares of habitat exists within the current extent of Borrow 7 Quarry investigation area. The drainage line is also connected to downstream gilgai habitat which although cleared is also suitable for the species. The Borrow 7 Quarry footprint is outside of this identified Ornamental Snake habitat, therefore a significant impact is considered unlikely. Under the guidelines, significant impacts on Ornamental Snake may occur if there is: • alteration of water quality or quantity affecting four or more hectares or important gilgai or riparian habitat • the fragmentation of important habitat or landscape corridors through the introduction of a barrier to dispersal • clearing between one and two hectares of important habitat.

Threatened Species Management Plan – Ornamental Snake (*Denisonia maculata*)	
	If actions can be managed to avoid these impacts then a significant impact is considered unlikely. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 322.3 ha of potential habitat for Ornamental Snake, this area includes non-remnant vegetation areas that were found to contain suitable gilgai habitat. In addition to the habitat loss, the other impacts that are likely to occur due to the works are habitat degradation to both terrestrial and aquatic habitats through increasing pest and weed pressures, increased edge effects and increase anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the study area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor and offsite infrastructure**: • General mitigation and management measures outlined in **Section 3.1**. • Locate where possible temporary and permanent infrastructure outside of potential Ornamental Snake habitat (gilgai habitats mapped in **Appendix C.1**) within the construction footprint. • Reduce the construction footprint at watercourse crossings and riparian zones. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places, by a licensed fauna spotter-catcher into adjacent habitat. Where possible the inactive breeding structure will be placed at a similar height. • Habitat features such as hollows and log piles will be salvaged, where possible, and placed in adjacent, intact habitat areas. • Should individuals be identified, their location will be recorded and they will be observed by the fauna spotter-catcher until they vacate the clearing footprint. • To avoid mortality of Ornamental Snakes during the active feeding and breeding wet season, in-stream works (namely at Belyando River, Mistake Creek, Logan Creek and Diamond Creek) should preferably be undertaken during dry conditions (i.e. nil or low flow conditions). • Develop and implement a Project Erosion and Sediment Control Plan to manage disturbance to

Threatened Species Management Plan – Ornamental Snake (*Denisonia maculata*)	
	creek banks and control site runoff. This plan will limit the potential for the degradation of downstream aquatic habitat. Erosion and sedimentation control measures are to be installed during in-stream works during flow conditions. • Work areas will be inspected daily for fauna that may have become trapped before work commences each day, and any fauna present to be relocated by a licensed fauna spotter-catcher. If any pits/trenches are to remain open after daily site works have been completed, they will be fenced, covered by an impenetrable barrier, or if possible, fauna ramps should be put in place to provide a potential means of escape for trapped fauna. • All sightings of Ornamental Snake should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Ornamental Snake to be documented on the fauna register. • Rehabilitation of any potential Ornamental Snake habitat would be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. • Install fauna underpasses (i.e. bridges, culverts) at key locations along the rail corridor where potential Ornamental Snake habitat has been identified, (i.e. at Belyando River, Mistake Creek, Logan Creek and Diamond Creek). Monitor the use of fauna underpasses after construction to assess utilisation by Ornamental Snakes. **Quarries**: • Quarrying and associated activities should avoid the rise immediately north of the Ornamental Snake record south of the Borrow 7 Quarry. • Quarrying and associated activities should avoid fragmenting or clearing important habitat along the creek line adjacent to the western and southern edge of the proposed Back Creek Quarry. • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to the drainage line south of Borrow 7 Quarry and Back Creek (potential habitat of Ornamental Snake).
Monitoring	A monitoring program would be developed and implemented for the Ornamental Snake at confirmed locations at Borrow 7 Quarry and offsite infrastructure study area. This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys pre-construction and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative activity levels. Surveys of permanent monitoring site would be undertaken using the Survey guidelines for Australia's threatened reptiles (DSEWPaC, 2011). • Monitoring of fauna underpasses in the vicinity of known habitat areas to assess evidence of use by Ornamental Snakes after installation for a minimum of three years. A rehabilitation monitoring program would also be required for rehabilitated Ornamental Snake habitat (i.e. Brigalow woodland) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for Ornamental Snake are carried out in accordance with the Survey guidelines for Australia's threatened reptiles (DSEWPaC, 2011). • No mortalities of Ornamental Snake recorded in the fauna register during construction. • No significant decline in Ornamental Snake activity levels at permanent monitoring sites during quarrying (at Borrow 7 Quarry) and during and after construction of the offsite infrastructure. • If Ornamental Snake populations confirmed along the rail alignment, evidence of use of the fauna underpasses in the vicinity of known habitat areas.

Threatened Species Management Plan – Ornamental Snake (*Denisonia maculata*)	
	• Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in Ornamental Snake activity levels. • Review location of the fauna underpasses and consider moving and/or adding structures and extending fencing. • Check fauna underpasses and associated fauna furniture for damage/blockage and rectify. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
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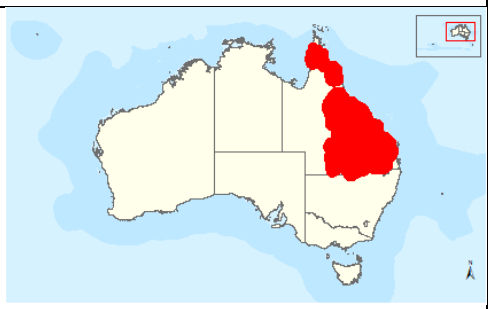
B.2 Yakka Skink

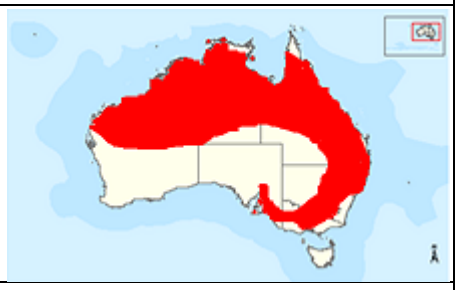
Threatened Species Management Plan – Yakka Skink (*Egernia rugosa*)	
Description	Yakka Skink is a robust lizard, averaging 40 cm from head to tail tip, making it one of the largest skinks in the region. Its body colour ranges from pale to dark brown, usually with a broad dark brown stripe extending along the back from the neck to the tail. This dark stripe is bordered on either side by a narrow, pale fawn stripe. Some of the scales at the rear of its head are fragmented, so it lacks the symmetrical arrangement of other skinks. There are several large, plate-like scales along the leading edge of the ear, partly concealing the opening (TSN, 2008a).
Known distribution	The known distribution of Yakka Skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt (North and South), Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographical Regions. Locations range from the Queensland/New South Wales border to Mungkan Kandju National Park (NP) on Cape York Peninsula, and from Bundaberg and the region west of Gympie to Mariala NP west of Charleville (Brigalow Belt Reptiles Workshop, 2010; Cogger, 2000; Wilson & Knowles, 1988) (cited DSEWPaC, 2013).  Source: DSEWPaC, 2013
Habitat	Yakka Skink occurs in a wide variety of vegetation types including Brigalow (*Acacia harpophylla*), Mulga (*A. aneura*), Bendee (*A. catenulata*), Lancewood (*A. shirleyi*), Belah (*Casuarina cristata*), Poplar Box (*Eucalyptus populnea*), Ironbark (*Eucalyptus* spp.), White Cypress Pine (*Callitris glaucophylla*) woodlands and open forests (Brigalow Belt Reptiles Workshop 2010). The core habitat of this species is within the Mulga Lands and Brigalow Belt South Bioregions (TSN, 2008a). Yakka Skink is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows (Brigalow Belt Reptiles Workshop, 2010; TSN, 2008a). The species often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation (Cogger, 2000; Ehmann, 1992b; Wilson & Knowles, 1988). 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 (Brigalow Belt Reptiles Workshop, 2010; TSN, 2008a). This species is not generally found in trees or rocky habitats (Chapple, 2003) (cited DSEWPaC, 2013).
Breeding	Yakka Skinks defecate in a pile outside burrow entrances (Brigalow Belt Reptiles Workshop, 2010; Wilson & Knowles, 1988). A colony of Yakka Skinks may use several sites during the year with the occupied burrow identified by scat piles near the entrance (Ehmann, 1992b). These skinks exhibit high site-fidelity, low fecundity and are long-lived, and are limited in their capacity to disperse from a colony site (Brigalow Belt Reptiles Workshop, 2010) (cited DSEWPaC, 2013). Breeding season unknown.
Feeding	Yakka Skink is omnivorous, consuming soft plant materials and fruits and a wide variety of invertebrates (beetles, grasshoppers, spiders) that venture into or near the burrow entrance (TSN, 2008a).
Status	Vulnerable under the EPBC Act and the NC Act
Threats	The main threats to Yakka Skink are habitat reduction and degradation, especially in the Brigalow Belt Bioregion (Covacevich et al. 1998). Other threats include inappropriate roadside management, including road widening and removal of microhabitat, and predation by Foxes (*Vulpes vulpes*) and Feral Cats (*Felis catus*) and ripping of rabbit warrens (TSN 2008a, 2008b).

Threatened Species Management Plan – Yakka Skink (*Egernia rugosa*)	
	High site-fidelity, low fecundity and long generation in Yakka Skink makes them susceptible to potential population crashes or even local extinctions (Brigalow Belt Reptiles Workshop 2010).
Potential distribution within Project (Rail) study area	**Rail corridor**: Yakka Skink was not detected during field surveys of the study area. This species may occur based on the presence of suitable habitat, namely: • Eucalypt open woodland with native grass understorey • Gidgee or mixed acacia woodland, on clay and clay loam plains with sparse shrub layer • Brigalow shrubby woodland or open forest typically on clay and clay loam plains • Eucalypt and acacia mixed woodland or forest often on clay soils • Riparian woodland or forest fringing watercourses, and coolabah open woodland on grassy • floodplain often with weedy understorey. Potential habitat for Yakka Skink is mapped in **Appendix C.2**. **Quarries**: Yakka Skink was not detected during field surveys of the quarry investigation areas and no database records. Potential for this species to occur on Disney Quarry as suitable habitat (intact woodland with fallen timber) occurs. Disney Quarry site is a large and topographically complex area that remains relatively well vegetated, although canopy cover varies across the site. A high rocky hillside running north-south dominates the site with lower rises adjacent to the east and west. Rocky areas on the upper slopes and where Spinifex dominates the ground layer provide abundant shelter sites for ground fauna, particularly reptiles such as Yakka Skink. **Offsite infrastructure**: The Yakka Skink was not detected during the field survey, however suitable habitat with appropriate microhabitat was located throughout the study area.
Potential impacts from Project (Rail)	**Rail corridor**: Vegetation clearing for the construction of the Project (Rail) will impact on 229.5 ha of potential habitat for Yakka Skink. In general, the construction footprint and surrounding study area are not considered to support an 'important population' of 'habitat critical to the survival' of Yakka Skink. Thus vegetation clearing (and associated impacts) is not considered to constitute a significant impact to Yakka Skink (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance, and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: The Disney Quarry site provides potential habitat for Yakka Skink. Development of the Disney Quarry site is likely to involve quarrying from the eastern and western ridgelines. Clearing activities on these ridgelines will result in the loss of potential habitat for Yakka Skink, and the movement of vehicles throughout the Disney Quarry site has the potential to impact on Yakka Skink. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 2.5 ha of potential habitat for Yakka Skink. In addition to the habitat loss, the other impacts that are likely to occur due to the works are habitat degradation to terrestrial habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor, quarries and offsite infrastructure**: • General mitigation and management measures outlined in **Section 3.1**. • Locate where possible temporary and permanent infrastructure outside of potential Yakka Skink habitat (open forest and woodland habitats mapped in **Appendix C.2**) within the construction

Threatened Species Management Plan – Yakka Skink (*Egernia rugosa*)	
	footprint. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. Where possible the inactive breeding structure will be placed at a similar height. • Habitat features such as hollows, log and rock piles will be salvaged, where possible, and placed in adjacent, intact habitat areas. • Work areas will be inspected daily for fauna that may have become trapped before work commences each day, and fauna present to be relocated by a licensed fauna spotter-catcher. If any pits/trenches are to remain open after daily site works have been completed, they will be fenced, covered by an impenetrable barrier, or if possible, fauna ramps should be put in place to provide a potential means of escape for trapped fauna. • All sightings of Yakka Skink or occupied burrows should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Yakka Skink to be documented on the fauna mortality register. • Rehabilitation of any potential Yakka Skink habitat would be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies.
Monitoring	Should Yakka Skink be found, a monitoring program would be developed and implemented to monitor any impacts from the Project (Rail). This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys pre-construction and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative activity levels. Surveys of permanent monitoring sites would be undertaken using the Survey guidelines for Australia's threatened reptiles (DSEWPaC, 2011). A rehabilitation monitoring program would also be required for rehabilitated Yakka Skink habitat (i.e. woodlands) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • No mortalities of Yakka Skink recorded in the register during construction.

Threatened Species Management Plan – Yakka Skink (*Egernia rugosa*)	
	• If populations found, no significant decline in Yakka Skink activity levels at permanent monitoring sites during and after construction. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in Yakka Skink activity levels. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Brigalow Belt Reptiles Workshop (2010). *Proceedings from the workshop for the nine listed reptiles of the Brigalow Belt bioregions. 18-19 August*. Queensland Herbarium, Brisbane. Chapple, D.G. (2003). Ecology, Life-History, and Behaviour in the Australian Scincid Genus Egernia, with Comments on the Evolution of Complex Sociality in Lizards. *Herptological Monographs*, 17:145-180. Cogger, H.G. (2000). *Reptiles and Amphibians of Australia - 6th edition*. Reed New Holland, Sydney, NSW. Covacevich, J.A., P.J. Couper & K.R. McDonald (1998). Reptile diversity at risk in the Brigalow Belt, Queensland. *Memoirs of the Queensland Museum*, 42(2):475-486. Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2013). *Egernia rugosa in Species Profile and Threats Database*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Fri, 28 Jun 2013 12:41:04 +1000. Ehmann, H. (1992b). Reptiles. In: Strahan, R., ed. *Encyclopaedia of Australian Animals*. Angus & Robertson, Sydney. Threatened Species Network (TSN) (2008a). *Yakka Skink Egernia rugosa National Threatened Species Day Information Sheet*. World Wildlife Foundation, Threatened Species Network and Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tsday08-skink.html. Threatened Species Network (TSN) (2008b). *Brigalow Belt bioregion: a biodiversity jewel.* WWF-Australia. Available from: http://www.wwf.org.au/publications/reptiles-brigalo-belt.pdf. Wilson, S.K. & D.G. Knowles (1988). *Australia's Reptiles: A Photographic Reference to the Terrestrial Reptiles of Australia*. Collins Publishers, Australia.

B.3 Black-chinned Honeyeater (*Melithreptus gularis*)

Threatened Species Management Plan – Black-chinned Honeyeater (*Melithreptus gularis*)	
Description	Black-chinned Honeyeater is a bird that grows to 15-17cm in length. They have a blacks head and side of cheeks, with a white band around the nape to their eye. Their back and rump are a dull olive-green. Their chin is black and their eyes are a deep brown colour and they have a patch of bare skin above their eye (Schodde & Tidemann, 1997).
Known distribution	Occurs through much of the northern end of Australia from the Kimberley-Pilbara in Western Australia to the east coast of Australia. Known to occur west of the Great Dividing Range (Pizzey & Knight, 2010). 
Habitat	Black-chinned Honeyeater is commonly associated with dry eucalypt forests and woodlands on water courses. Often these areas do not have a shrub or understorey (Pizzey & Knight, 2010).
Breeding	Black-chinned Honeyeater is known to occur in small communal groups that consist of between 2-12 individual birds (Schodde and Tidemann, 1997). Breeding for this species occurs between July and December. The nest is located high in the outer foliage of trees and the nest resembles a fragile cup made up of bark shreds, grass, plant fibre and wool (Pizzey & Knight, 2010). Females commonly lay two salmon coloured eggs that are incubated for 14-15 days. After hatchling the chicks fledge at 13-14 days (Schodde & Tidemann, 1997).
Feeding	Black-chinned Honeyeater feeds on nectar from the blossoms of vegetation that occur within their habitat (Schodde & Tidemann, 1997).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Black-chinned Honeyeater is under threat from habitat clearing and habitat degradation to its preferred habitats such as the infestation of weeds and changes to fire regimes. Black-chinned Honeyeater is also under threat from predation from feral species such as cats (Schodde & Tidemann,1997).
Potential distribution within Project (Rail) study area	No Black-chinned Honeyeaters were recorded during any of the assessments. However preferred habitat for this species was recorded in the realigned balloon loop, and therefore it is considered likely that this species will occur within the study area and surrounding areas.
Potential impacts from Project (Rail)	**Rail corridor:** Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance, and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: Vegetation clearing for the establishment and operation of the quarries will result in the clearing of habitat for Black-chinned Honeyeater, however given the abundance of habitat in the

Threatened Species Management Plan – Black-chinned Honeyeater (*Melithreptus gularis*)	
	surrounding area it is not likely to be a significant impact. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 4.5 ha of potential habitat for Black-chinned Honeyeater. In addition to the habitat loss, the other impacts that are likely to occur due to the works are habitat degradation to terrestrial habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor, quarries and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1** • Locate where possible temporary and permanent infrastructure outside of watercourses and riparian zones within the construction footprint. • Reduce the construction footprint through watercourses and riparian zones. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places, by a licensed fauna spotter-catcher into adjacent habitat. Where possible the inactive breeding structure will be placed at a similar height. • Habitat features such as hollows and log piles will be salvaged, where possible, and placed in adjacent, intact habitat areas. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • Restrict the use of barbed wire fencing or incorporate fencing with non-barbed top wire, especially

Threatened Species Management Plan – Black-chinned Honeyeater (*Melithreptus gularis*)	
	near watercourses and water bodies. • All sightings of Black-chinned Honeyeaters or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Black-chinned Honeyeaters to be documented on the fauna register. • Rehabilitation of any potential Black-chinned Honeyeaters habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies.
Monitoring	Should Black-chinned Honeyeaters be found, a monitoring program would be developed and implemented to monitor any impacts of the Project (Rail). This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys pre-construction and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative abundance. Survey of permanent monitoring sites would be undertaken using the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • Monitoring of any nests retained in-situ during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated inactive nests in adjacent habitat to assess use by Black-chinned Honeyeaters. A rehabilitation monitoring program would also be required for rehabilitated Black-chinned Honeyeater habitat (i.e. woodland along riparian zones) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for Black-chinned Honeyeater are carried out in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • No mortalities of Black-chinned Honeyeater recorded in the fauna register during construction. • If populations found, no significant decline in Black-chinned Honeyeater activity levels at permanent monitoring sites during and after construction. • Uptake of relocated nests by Black-chinned Honeyeaters for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F. and Hogan, L.D. (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Pizzey, G and Knight, F (2010) *The field Guide to the Birds of Australia,* 8th ed. HarperCollins Publisher, Sydney. Schodde, R. and Tidemann, S. (1997) *The Reader's Digest Complete Book of Australian Birds*, 2nd

Threatened Species Management Plan – Black-chinned Honeyeater (*Melithreptus gularis*)	
	Edition, Reader's Digest, Sydney.

B.4 Black-necked Stork (*Ephippiorhynchus australis*)

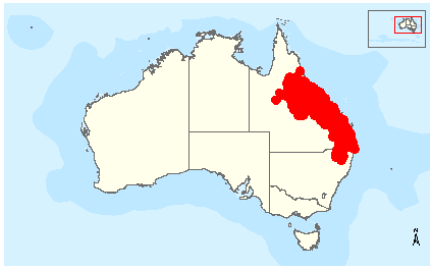
Threatened Species Management Plan – Black-necked Stork (*Ephippiorhynchus australis*)	
Description	Black-necked Stork stands about 1.2m tall and both sexes are similar in their plumage, the only difference being that adult males have dark eyes where adult females have yellow eyes. Their plumage on the head, neck, scapulars, tail and broad band extending across the centre of both upper and lower wing surfaces is a greenish black colour and the rest of the bird is white. They have a large black bill and their feet and legs are red in colour (Scodde & Tidemann, 1997).  Source: Dreamstime
Known distribution	Black-necked Stork is known to occur along the northern and eastern coasts and has been recorded as far south as Sydney. The specie is less common in its southern range (Scodde & Tidemann, 1997).
Habitat	This species is commonly associated with freshwater bodies such as lakes, swamps and pools within river systems. They are also known to occur near mangrove flats along the coast (Scodde & Tidemann, 1997).
Breeding	Black-necked Stork is known to breed between February and June. During the breeding season both sexes will construct or repair the nest. The nest consists of a large bulky platform commonly 1.8 m wide and 0.9 m thick (Scodde & Tidemann, 1997). The nest is constructed by the birds carrying sticks up to 1 m in length to the nest and these are then stomped into a platform. On top of this platform a layer of dried grass and reeds of about 20 cm thickest is laid and a hollow is made for the eggs. The nest is usually located at the top of a tree or tall shrub near a swamp (Scodde & Tidemann, 1997). Both sexes incubate the eggs, once hatched the chicks are attended regularly until they are the age of 30 days; from this point they are left for long periods of time and the young have developed a threat posture to warn off predators (Scodde & Tidemann, 1997). The chicks do not leave the nest until 100 - 115 days of age. During the time in the nest the parent birds bring food and water to the chicks (Scodde & Tidemann, 1997). After breeding it appears mated pairs continue to accompany each other however it is not known if they mate for life or seek new partners each year (Scodde & Tidemann, 1997).
Feeding	Black-necked Storks are commonly seen foraging for food by striding through the water and probing with their bill. They also forage in a similar way to herons by either standing and waiting for prey or slowly stalking through the water and ambushing prey with a sudden thrust of their heads. Black-necked Storks are also known to feed on the edges of drying waterholes and in these situations several birds may be feeding at once on the surplus of prey (Scodde & Tidemann, 1997).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Black-necked Stork is under threat from alterations to wetlands, watercourses and other bodies of water including pollution and changes to the hydrological regime. The species is also impacted by habitat degradation to its preferred habitats such as the infestation of aquatic weeds and sedimentation of water courses. Black-necked Stork is also under threat from predation from feral species such as cats, dogs, pigs and foxes particularly when raising their young (Schodde & Tidemann, 1997). Increased traffic movement through preferred habitat areas also impacts Black-necked Stork as they are a slow moving bird during flight especially during landing and take-off and this makes them highly susceptible to vehicle strike.
Potential distribution within	**Rail corridor:** Black-necked Stork was not detected during field survey, however suitable habitat was

Threatened Species Management Plan – Black-necked Stork (*Ephippiorhynchus australis*)	
Project (Rail) study area	recorded throughout the study area. **Quarries:** A single individual was observed on a large farm dam in the study area but will not occur on quarry sites. **Offsite Infrastructure:** Black-necked Stork was observed on farm dams throughout the study area.
Potential impacts from Project (Rail)	**Rail corridor:** Vegetation clearing for the construction of the Project (Rail) will impact on 66 ha of potential habitat for Black-necked Stork (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance, and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: Although Black-necked Stork recorded on large farm dam in study area, this species will not occur in the quarry footprints and no impacts are anticipated. **Offsite infrastructure**: No loss of potential habitat for this species from offsite infrastructure. Other impacts that are likely to occur due to the works are habitat degradation to aquatic habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1**. • Locate where possible temporary and permanent infrastructure outside of vegetated water bodies within the construction footprint. • Where possible, allow a 50 m set back distance of railway and roads from water bodies to prevent Black-necked Storks from being flushed into the path of vehicles such as cars, trucks and trains. • Where possible schedule the clearing to be outside the main breeding season of the Black-necked Stork. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within

Threatened Species Management Plan – Black-necked Stork (*Ephippiorhynchus australis*)	
	the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Should individuals be identified, the fauna spotter-catcher would record their location and monitor them until they vacate the clearing footprint. • As Black-necked Storks have long fledging times (chicks do not leave the nest until 100 -115 days of age), should clearing of the area be unavoidable during this period, the fauna spotter-catcher would remove the nest and provide the eggs/young to a wildlife carer. • Should an inactive nest be identified, the fauna spotter-catcher would remove and relocate the nest. Displaced nests would be relocated by the fauna spotter-catcher to a pre-determined suitable relocation site in similar habitat. • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to water bodies. • Restrict the use of barbed wire fencing or incorporate fencing with non-barbed top wire, especially near watercourses. • All sightings of Black-necked Stork or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Black-necked Stork to be documented on the fauna register. • Rehabilitation of any potential Black-necked Stork habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. **Quarries** • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to water bodies.
Monitoring	A monitoring program would be developed and implemented for Black-necked Stork to monitor impacts from the Project (Rail). This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys pre-construction and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative abundance. Survey of permanent monitoring sites would be undertaken using the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • Monitoring of any occupied nests retained in-situ during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated inactive nests in suitable habitat to assess use by Black-necked Storks. A rehabilitation monitoring program would also be required for rehabilitated Black-necked Stork habitat (i.e. wetlands, swamps and water bodies) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for Black-necked Stork are carried out in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • No mortalities of Black-necked Stork recorded in the fauna register during construction. • No significant decline in Black-necked Stork activity levels at permanent monitoring sites during and after construction. • Uptake of relocated nests by Black-necked Storks for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation

Threatened Species Management Plan – Black-necked Stork (*Ephippiorhynchus australis*)	
	criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. Consider potential for natural variation to be responsible for decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F. and Hogan, L.D. (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Schodde, R. and Tidemann, S. (1997) *The Reader's Digest Complete Book of Australian Birds*, 2nd Edition, Reader's Digest, Sydney.

B.5 Black-throated Finch (*Poephila cincta cincta*)

Threatened Species Management Plan – Black-throated Finch (*Poephila cincta cincta*)		
Description	Black-throated Finch is a stocky grass-finch that is about 10 cm total in length. The body plumage of this species is primary shades of brown with a grey head and a prominent black 'bib' and white under tail. Black-throated Finch also has bright pink legs and feet (Grice, 2012).	 Source: GHD, 2012d
Known distribution	Black-throated Finch is known to formerly occur in eastern Queensland south of Mareeba to as far south as north-eastern NSW. However reports of this species south of Rockhampton since 1970s are very few records (Grice, 2012). This species is now known to occur in two general locations, the Townsville region and within scattered sites in central-eastern Queensland between Aramac and Great Basalt Wall National Park (DSEWPaC, 2013).	 Source: DSEWPaC, 2013
Habitat	The preferred habitat of Black-throated Finch is grassy, open woodlands and forests dominated by *Eucalyptus, Corymbia* and *Melaleuca* species. They also prefer habitats that occur within a few kilometres of water. Black-throated Finch occur in some modified habitats such as rail corridors and beneath power lines but in those areas where the habitat is more-or-less intact (Grice, 2012).	
Breeding	Most Australian finches reach sexual maturity by 6 months of age, however this information is based on captive breed populations (DSEWPaC, 2013). Both sexes construct the nest in a variety of locations including hollow branches, mistletoe, long grass, under raptor nests or within other species (i.e. babbler) old nests. The nest is typically situated within close proximity to a water source. Clutches are usually laid	

Threatened Species Management Plan – Black-throated Finch (*Poephila cincta cincta*)	
	from August to December in central-east Queensland, however clutches have been recorded in March, April and July. This may indicate that in good conditions these finches breed throughout the year. Commonly a clutch consists of five or six eggs (clutch sizes can range from 3 – 9). Based on captive populations the clutch is incubated for 15 days, the chicks fledge at 22 days and the fledglings are independent 18 days after fledging the nest (DSEWPaC, 2013). Both sexes will incubated, feed and brood the young (DSEWPaC, 2013).
Feeding	Black-throated Finch requires access to water on a daily basis and also feeds on seeding grasses (Grice, 2012; DSEWPaC, 2013). They usually feed on half-ripe seeds of *Dactyloctenium*, *Digitaria*, *Eremochloa*, *Paspalidium* and *Setaria,* as well as the seed from other plants. They are also noted to feed on insect in particular termite larvae during the breeding season. The majority of the seed is pecked from the ground however they are known to perch on grass stems and peck the seed from the seed head (DSEWPaC, 2013).
Status	Endangered under the EPBC Act and the NC Act.
Threats	Threats to Black-throated Finch include habitat clearing and habitat degradation caused by the grazing of livestock such as cattle, changes in the fire regimes and infestation from weeds. Changes in hydrological regimes can also impact on the habitat of Black-throated Finch as the distance to water sources may alter movement of this species through the landscape. Predation from cats and other feral predator and collection for aviculture are also threats to Black-throated Finch (Grice, 2012; DSEWPaC, 2013).
Potential distribution within Project (Rail) study area	**Rail corridor**: Black-throated Finch has been recorded on the northern and southern sections of the Mine through a number of surveys. Black-throated Finch has been recorded north of the balloon loop at the far western section of the rail alignment however no direct observations of the species was made within the rail corridor. Potential habitat for Black-throated Finch in the rail corridor is mapped in **Appendix C.3**. **Quarries**: No observations of this species within the quarry investigation areas. Potential to occur at Back Creek quarry site which retains narrow riparian strip with permanent water but is degraded by cattle. Black-throated Finch may forage on the Disney Quarry site although the lack of nearby permanent water may preclude these species from occurring. **Offsite infrastructure**: A single individual Black-throated Finch was observed in the south-western corner of the study area. It was observed at a farm dam within low quality habitat. Potential habitat for Black-throated Finch in the offsite infrastructure is mapped in **Appendix C.3**.
Potential impacts from Project (Rail)	**Rail corridor:** Vegetation clearing for the construction of the Project (Rail) will impact on 64.7 ha of potential habitat for Black-throated Finch. In general, the construction footprint and surrounding study area are not considered to support an 'important population' or 'habitat critical to the survival' of Black-throated Finch. Thus vegetation clearing (and associated impacts) is not considered to constitute a significant impact to Black-throated Finch (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance, and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: Clearing of riparian vegetation at Back Creek quarry may impact on this species. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 4.7

Threatened Species Management Plan – Black-throated Finch (*Poephila cincta cincta*)	
	ha of potential habitat for Black-throated Finch. In addition to the habitat loss, the other impacts that are likely to occur due to the works are habitat degradation to terrestrial habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	The EIS recommended that further studies into the breeding, feeding, habitat and distribution of Black-throated Finch within the wider landscape be undertaken for the Project (Mine) to inform the development of a specific Black-throated Finch management plan. Management measures may include securing selected sites for conservation, addressing grazing issues and a breeding and reintroduction program. Due to the sighting of a Black-throated Finch within the Project (Rail) study area it is recommended that this plan also encompasses the Project (Rail). Suitable management measures developed in this plan would then also be implemented for the Project (Rail). **Rail corridor, quarries and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1**. • Any suitable management measures identified in the Black-throated Finch management plan being developed for the Project (Mine). • Locate where possible temporary and permanent infrastructure outside of potential Black-throated Finch habitat (mapped in **Appendix C.4**) within the construction footprint. • Where possible, allow a 50 m set back distance of railway and roads from potential Black-throated Finch habitat to prevent species being flushed into the path of vehicles such as cars, trucks and trains. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and

Threatened Species Management Plan – Black-throated Finch (*Poephila cincta cincta*)	
	ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • All sightings of Black-throated Finch or nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Black-throated Finch to be documented on the fauna register. • Rehabilitation of any Black-throated Finch habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies.
Monitoring	A monitoring program would be developed and implemented for Black-throated Finch to monitor any impacts from the Project (Rail). This would be incorporated into the specific Black-throated Finch management plan for the Project and would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys and annual monitoring during and after construction for a duration of three years to assess ongoing presence/absence and relative abundance. Surveys of permanent monitoring sites would follow the Survey guidelines for Australia's threatened birds (DSEWPaC, 2010). • Monitoring of any nests retained in-situ during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated inactive nests in suitable habitat to assess use by Black-throated Finch. A rehabilitation monitoring program would also be required for rehabilitated Black-throated Finch habitat (i.e. grassy open woodlands) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for the Black-throated Finch are carried out in accordance with the Survey guidelines for Australia's threatened birds (DSEWPaC, 2010). • No mortalities of Black-throated Finch recorded in the register during construction. • No significant decline in Black-throated Finch activity levels at permanent monitoring sites during and after construction. • Uptake of relocated nests by Black-throated Finch for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) (2010) *Survey guidelines for Australia's threatened birds*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2013) *Poephila cincta cincta in Species Profile and Threats Database*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from:

Threatened Species Management Plan – Black-throated Finch (*Poephila cincta cincta*)	
	http://www.environment.gov.au/sprat. Accessed Thu, 27 Jun 2013 14:57:58 +1000

B.6 Cotton Pygmy-goose (*Nettapus coromandelianus*)

Threatened Species Management Plan – Cotton Pygmy-goose (*Nettapus coromandelianus*)	
Description	The males have a brown crown, white face with some brown feathers present on the back of the neck. Their backs are a glossy green converting into a brown colour on their tails. They have a black collar between their neck and belly and their breast and belly plumage are freckled brown. They have a black bill, olive feet and bright red eyes (Scodde & Tidemann, 1997). The females are less green on the back and lack the collar between the neck and belly. Their belly plumage is barred with fine brown marks. The females have brown eyes and also have a brown eye stripe where the males don't (Scodde & Tidemann, 1997).
Known distribution	This species is known to occur in coastal and sub coastal districts from the tip of Cape York Peninsula to the Clarence River in NSW. The species is becoming increasingly rare in the south end of its distribution and the main population is known to occur between Rockhampton and Ingham, Queensland (Schodde & Tidemann, 1997).
Habitat	Their preferred habitat is deep, permanent freshwater lagoons with waterlilies. They are also known to occur in large freshwater lakes and farm dams, edges of quiet rivers and creeks fringed with waterlilies. However, Cotton Pygmy-goose are not known to occur in streams, shallow swamps or water covered with vegetation (Schodde & Tidemann, 1997).
Breeding	The breeding of this species in southern Queensland occurs between September to November and between January to March in northern Queensland. Cotton Pygmy-goose nests in tree hollows up to about 10 m off the ground. The nest tree is commonly located within 20 m of water. It is the female of the species that incubates the clutch. A clutch of eggs usually consists of 6-9 pearly white eggs (Schodde & Tidemann, 1997).
Feeding	The feeding behaviour of this species is to cruise among waterlilies and strip seeds and seed heads from aquatic plants. They will also dabble at the surface and will occasional dart after insects. On the coast their diet consists of approximately 50% pond weed and the rest comprising of seeds and aquatic grasses. In inland swamps they feed more on sedges and less on pond weed (Schodde & Tidemann, 1997).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Cotton Pygmy-goose is under threat from alterations to wetlands, watercourses and other water bodies including pollution and changes to the hydrological regime. The species is also impacted by habitat degradation to its preferred habitats such as the infestation of aquatic weeds and sedimentation of watercourses. Cotton Pygmy-goose is also under threat from predation from feral species such as cats, dogs, pigs and foxes particularly when raising their young (Schodde & Tidemann, 1997).
Potential distribution within Project (Rail) study area	**Rail corridor:** The Cotton Pygmy-goose was not detected during field surveys, however suitable habitat was recorded throughout the study area. **Quarries:** A flock of 30 individuals was observed on a large farm dam south-east of Borrow 8 quarry site. However, there is no potential habitat for this species at the quarry sites and is not expected to occur. **Offsite Infrastructure:** Black-necked Stork was observed on farm dams throughout the study area.
Potential impacts from Project (Rail)	**Rail corridor:** Clearing for the construction of the Project (Rail) will impact on 66 ha of potential habitat for Cotton Pygmy-goose (GHD, 2012a). Clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term

Threatened Species Management Plan – Cotton Pygmy-goose (*Nettapus coromandelianus*)	
	duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). **Quarries**: The establishment and operations of the quarries will not impact on potential habitat (i.e. water bodies) for the Cotton Pygmy-goose. However, offsite impacts on the farm dam east of the Borrow 8 quarry (where a flock of Cotton Pygmy-goose was recorded) may occur due to degradation of water quality in downstream watercourses and water bodies if impacts are not mitigated. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will not impact on potential habitat for the Cotton Pygmy-goose (i.e. water bodies). However, habitat degradation to aquatic habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust is likely to occur. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1** • Where possible, allow a 50 m set back distance of railway and roads from water bodies to prevent Cotton Pygmy-geese from being flushed into the path of vehicles such as cars, trucks and trains. • Locate where possible temporary and permanent infrastructure outside of water bodies within the construction footprint. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna

Threatened Species Management Plan – Cotton Pygmy-goose (*Nettapus coromandelianus*)	
	displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • Restrict the use of barbed wire fencing or incorporate fencing with non-barbed top wire, especially near water bodies. • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to watercourses and water bodies. • All sightings of Cotton Pygmy-geese or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed spotter-catcher. Any injuries or death of Cotton Pygmy-goose to be documented on the fauna register. • Rehabilitation of any potential Cotton Pygmy-goose habitat would be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. **Quarries:** • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to watercourses and water bodies.
Monitoring	A monitoring program would be developed and implemented for Cotton Pygmy-goose to monitor any impacts from the Project (Rail). This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas (water bodies). • Baseline surveys and annual monitoring during and after construction for a duration of three years to assess ongoing presence/absence and relative abundance. Field survey of permanent monitoring sites would be undertaken using the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al., 2012). • Monitoring of any occupied nests retained in-situ during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated inactive nests in suitable habitat to assess use by Cotton Pygmy-goose. A rehabilitation monitoring program would also be required for rehabilitated Cotton Pygmy-goose habitat (i.e. wetlands and freshwater lakes and dams) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for the Cotton Pygmy-goose are carried out in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al., 2012). • No mortalities of Cotton Pygmy-goose recorded in the register during construction. • No significant decline in Cotton Pygmy-goose activity levels at permanent monitoring sites during and after construction. • Uptake of relocated nests by Cotton Pygmy-goose for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake aquatic weed control and pest animal control if required in known habitat areas.

Threatened Species Management Plan – Cotton Pygmy-goose (*Nettapus coromandelianus*)	
	• Provide offsets where there are no corrective actions for mitigation measures.
References	Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F. and Hogan, L.D. (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Schodde, R and Tidemann, S (1997) *The Reader's Digest Complete Book of Australian Birds*, 2nd Edition, Reader's Digest, Sydney.

B.7 Grey Falcon (*Falco hypoleucos*)

Threatened Species Management Plan – Grey Falcon (*Falco hypoleucos*)	
Description	Both sexes of Grey Falcon are very similar, the upper parts are a pale blue-grey with faint black shaft streaks. The tail feathers are barred darker grey. Their face and underparts are grey-white with thin dark shaft streaks. Their eyes are brown and they have a dark grey bill. The cere, feet and eye ring are bright yellow and the talons are black (Scodde & Tidemann, 1997).
Known distribution	Grey Falcons are known to occur in the lightly timbered plains of mainland Australia west of the Great Dividing Range (Scodde & Tidemann, 1997).
Habitat	Timbered plains of the dry interior and eucalypt lined rivers of the interior (Scodde & Tidemann, 1997).
Breeding	Grey Falcon is known to breed between July and November. For nesting they typically use an old nest of other species such as crows of other hawks. They line the nests with animal fur and bark. They lay between 2 and 4 eggs that are incubated for 32-35 days by the female. The female typically broods the young and male hunts, however the male will brood the young when the female hunts. The young fledge in 42-45 days, after fledging both parents are responsible for feeding the young. After fledging, young falcons may stay with their parents for a further 6 months before dispersing (Scodde & Tidemann, 1997).
Feeding	Falcons like most birds of prey will scan for prey during flight. Small reptiles and mammals are ambushed and snatched from the ground (Scodde & Tidemann, 1997).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Grey Falcon is threatened by habitat clearing and degradation that leads to loss of breeding sites and decline in prey species. They are also threatened by pest and weed infestations that can either compete for food resources or degrade the habitat (Schodde & Tidemann, 1997).
Potential distribution within Project (Rail) study area	No Grey Falcons or evidence of recent use were directly observed during the field surveys conducted for the rail corridor, quarries or offsite infrastructure. However preferred woodland habitats were identified within the rail corridor.
Potential impacts from Project (Rail)	**Rail corridor**: Vegetation clearing for the construction of the Project (Rail) will impact on 147.1 ha of potential habitat for Grey Falcon (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: No impacts reported. **Offsite infrastructure**: No impacts reported.
Mitigation and management measures	**Rail corridor:** • General mitigation and management measures outlined in **Section 3.1** • Locate where possible temporary and permanent infrastructure outside of potential Grey Falcon habitat (i.e. riparian woodlands) within the construction footprint.

Threatened Species Management Plan – Grey Falcon (*Falco hypoleucos*)	
	• Reduce the construction footprint through watercourses and riparian woodlands where Grey Falcons may nest. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • All sightings of Grey Falcon or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Grey Falcon to be documented on the fauna mortality register. • Rehabilitation of any potential Grey Falcon habitat would be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies.
Monitoring	Should Grey Falcon be found, the following monitoring is proposed: • Monitoring of any nests retained in-situ during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated nests in suitable habitat to assess use by Grey Falcon. A rehabilitation monitoring program would also be required for rehabilitated Grey Falcon habitat (i.e. riparian habitat) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).

Threatened Species Management Plan – Grey Falcon (*Falco hypoleucos*)	
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • No mortalities of Grey Falcon recorded in the register during construction. • Uptake of relocated nests by Grey Falcon for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake weed and pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Eyre TJ, Ferguson DJ, Hourigan CL, Smith GC, Mathieson MT, Kelly AL, Venz MF & Hogan LD (2012). *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Schodde, R and Tidemann, S (1997) *The Reader's Digest Complete Book of Australian Birds*, 2nd Edition, Reader's Digest, Sydney.

B.8 Lewin's Rail (*Lewinia pectorlais*)

Threatened Species Management Plan – Lewin's Rail (*Lewinia pectorlais*)	
Description	Lewin's Rail has a chestnut-brown with black flecks across their crown and nape. The rest of the upper parts of the body are dark brown with streaks. Wings are ducky colour with coverts of white barring. They have a pink or reddish-brown bill with a dark tip and their feet are a pinkie-grey (Schodde & Tidemann, 1997).
Known distribution	Uncommon along the southern and eastern coastlines. They are rarely recorded inland (Schodde & Tidemann, 1997)
Habitat	This species lives on the ground of freshwater and brackish marshes, wet heaths and swampy grasslands. They prefer low, dense vegetation in which they form runs (Schodde & Tidemann, 1997).
Breeding	Only the female of the species is known to brood. They breed between August and December. Females construct a nest of grass and rushes woven into a cup within dense vegetation with a well-defined runway. Females lay between 4-6 eggs and will incubate the eggs for 20 days. The young typically leave the nest within hours of hatching (Schodde & Tidemann, 1997)
Feeding	They feed by probing their bills into cracks and holes in the ground searching for insects, molluscs, crustaceans and plant matter (Schodde & Tidemann,1997).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Lewin's Rail is under threat from alterations to wetlands, watercourses and other bodies of water including pollution and changes to the hydrological regime. The species is also impacted by habitat degradation to its preferred habitats such as the infestation of aquatic weeds and sedimentation of water course. Lewin's Rail is also under threat from predation from feral species such as cats, dogs, pigs and foxes particularly when raising their young (Schodde & Tidemann, 1997).
Potential distribution within Project (Rail) study area	**Rail corridor**: Lewin's Rail was not recorded but potential habitat for this species includes water bodies (i.e. farm dams) across the study area. **Quarries**: Lewin's Rail was not recorded and no potential habitat for this species is located at the quarry sites. **Offsite infrastructure**: Two Lewin's Rail were observed at farm dams in the offsite infrastructure study area.
Potential impacts from Project (Rail)	**Rail Corridor:** No impacts reported. However, construction of the Project (Rail) will impact on potential habitat (i.e. vegetated water bodies) for Lewin's Rail and erosion and sedimentation of watercourses has potential to degrade habitat. **Quarries**: No impacts reported. However, erosion and sedimentation of watercourses has potential to degrade aquatic habitat off-site. **Offsite infrastructure**: No impacts reported. However, construction of the Project (Rail) will impact on potential habitat (i.e. vegetated water bodies) for Lewin's Rail and erosion and sedimentation of watercourses has potential to degrade aquatic habitat.
Mitigation and management measures	**Rail corridor and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1** • Locate where possible temporary and permanent infrastructure outside of vegetated water bodies within the construction footprint. • Where possible, allow a 50 m set back distance of railway and roads from vegetated water bodies to prevent Lewin's Rail from being flushed into the path of vehicles such as cars, trucks and trains.

Threatened Species Management Plan – Lewin's Rail (*Lewinia pectorlais*)	
	• Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to watercourses and water bodies. • All sightings of Lewin's Rail or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Lewin's Rail to be documented on the fauna register. • Rehabilitation of any potential Lewin's Rail habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. **Quarries:** • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality impacts to watercourses and water bodies.
Monitoring	Should Lewin's Rail be found, a monitoring program would be developed and implemented to monitor impacts from the Project (Rail). This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas.

Threatened Species Management Plan – Lewin's Rail (*Lewinia pectorlais*)	
	• Baseline surveys pre-construction and annual monitoring during and after construction for a duration of three years to assess ongoing presence/absence and relative abundance. Survey of permanent monitoring sites would be undertaken using the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • Monitoring of any nests retained in-situ during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated inactive nests in suitable habitat to assess use by Lewin's Rail. A rehabilitation monitoring program would also be required for rehabilitated Lewin's Rail habitat (i.e. wetlands, swamps and water bodies) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for Lewin's Rail are carried out in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • No mortalities of Lewin's Rail recorded in the fauna register during construction. • No significant decline in Lewin's Rail activity levels at permanent monitoring sites during and after construction. • Uptake of relocated nests by Lewin's Rail for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake aquatic weed control and pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F. and Hogan, L.D. (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Schodde, R. and Tidemann, S. (1997) *The Reader's Digest Complete Book of Australian Birds*, 2nd Edition, Reader's Digest, Sydney.

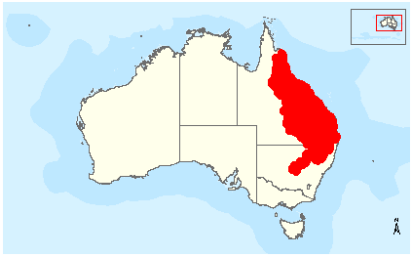
B.9 Square-tailed Kite (*Lophoictinia isura*)

Threatened Species Management Plan – Square-tailed Kite (*Lophoictinia isura*)	
Description	Both sexes of Square-tailed Kite look similar apart from the female in a larger bird. The upper parts of the bird are mottled brown-black. They have rufous-brown streaking across the crown, neck and all under parts. They have black blotches throughout their breast. Their chin, face and forehead are an off white colour. They have a long, grey tail with black tips and yellow-brown legs and feet with black claws (Schodde & Tidemann, 1997).
Known distribution	They are thinly distributed throughout open forest and woodlands throughout all of Queensland (Schodde & Tiedemann, 1997).
Habitat	They prefer open eucalypt forests and woodlands in which they live solitary or as a well dispersed pair (Schodde & Tidemann, 1997).
Breeding	Both sexes build the nest and incubate the eggs. They may use the same nest year after year. They breed between July – October and their nest is usually located 12-26 metres above the ground. The female lays 2-3 eggs and incubates them for 35-42 days. The young are feed by both parents and fledge the nest in 8-10 weeks (Schodde & Tidemann, 1997).
Feeding	Square-tailed Kite feeds primarily by snatching young birds out of their nests. They will occasionally take prey from ground and very rarely feed on carrion (Schodde & Tidemann, 1997).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Square-tailed Kite is threatened by habitat clearing and degradation that leads to loss of breeding sites and decline in prey species. They are also threatened by pest and weed infestations that can either compete for food resources or degrade the habitat (Schodde & Tidemann, 1997).
Potential distribution within Project (Rail) study area	Rail corridor: No Square-tailed Kites was recorded during the field surveys for the rail corridor or quarries. However, this species was recorded within the realigned balloon loop and therefore it is considered likely that it will occur within suitable woodland habitat throughout the study area and surrounding areas. Quarries: **Offsite infrastructure**: No Square-tailed Kites were recorded during the field surveys, however riparian and floodplain vegetation associated with the Carmichael River are likely to represent particularly ideal habitat for this species.
Potential impacts from Project (Rail)	**Rail corridor:** No impacts reported. However, clearing of riparian woodlands will result in the loss of potential habitat for this species. Clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). **Quarries**: No impacts reported. However, erosion and sedimentation of watercourses has potential to degrade aquatic habitat off-site. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 4.5 ha of potential habitat for the Square-tailed Kite. In addition to the habitat loss the other impacts that are likely to occur due to the works are habitat degradation to terrestrial habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase

Threatened Species Management Plan – Square-tailed Kite (*Lophoictinia isura*)	
	the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1** • Locate where possible temporary and permanent infrastructure outside of riparian woodland habitat within the construction footprint. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • All sightings of Square-tailed Kite or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Square-tailed Kite to be documented on the fauna register. • Rehabilitation of any potential Square-tailed Kite habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. **Quarries:** • Develop and implement an Erosion and Sediment Control Plan to avoid any stormwater quality

Threatened Species Management Plan – Square-tailed Kite (*Lophoictinia isura*)	
	impacts to watercourses and water bodies.
Monitoring	Should Square-tailed Kite be found, the following monitoring is proposed: • Monitoring of any occupied nests avoided during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. • Monitoring of any relocated inactive nests in suitable habitat to assess use by Square-tailed Kite. A rehabilitation monitoring program would also be required for rehabilitated Square-tailed Kite habitat (open forests and woodlands) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • No mortalities of Square-tailed Kite recorded in the fauna register during construction. • No abandonment on young in occupied nests that have been avoided during construction. • Uptake of relocated nests by Square-tailed Kite for breeding. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Under weed control and pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F. and Hogan, L.D. (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Schodde, R. and Tidemann, S. (1997) *The Reader's Digest Complete Book of Australian Birds*, 2nd Edition, Reader's Digest, Sydney.

B.10 Squatter Pigeon (southern) (*Geophaps scripta scripta*)

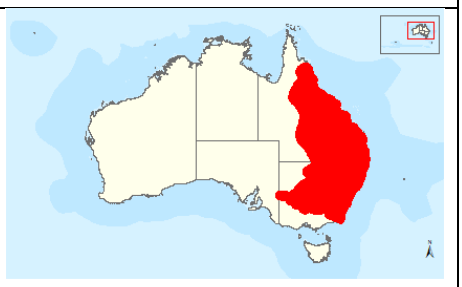
Threatened Species Management Plan – Squatter Pigeon (southern) (*Geophaps scripta scripta*)	
Description	Squatter Pigeon is a medium-sized, heavily built, long legged pigeon. The total length of the pigeon is 26-32 cm including its short tail. Overall the bird is mostly brown with a bold black and white face pattern near the blue eye ring. The upper wings have green or violet iridescent patches and the breast is a blue-grey with white flanks (Reis, 2012).  Source: SKM
Known distribution	Squatter Pigeons are largely restricted to Queensland. It is known to occur north of the Burdekin River, east to Townsville and Proserpine and south to the Queensland-New South Wales Border and west as far as Longreach. Where Squatter Pigeon occurs it can be locally abundant (Reis, 2012).  Source: DSEWPaC, 2013
Habitat	Squatter Pigeon is commonly found in the grassy understorey of eucalypt woodlands, usually with ready access to water. Sandy areas dissected by gravel ridges are preferred and burnt areas are frequented (Frith, 1982). Where encountered in the Project area, it has occurred in non-remnant vegetation areas in close association with cattle. This habitat varies seasonally in the extent of vegetative cover, however, the essentially degraded nature of habitat and intensive use of the area for grazing suggest that this species is resilient to some extent to alterations in land use.
Breeding	Squatter Pigeons nest on the ground, usually laying two eggs in sheltered positions (Crome, 1976; Frith, 1982).
Feeding	Squatter Pigeons are known to forage for seeds (including those of improved pasture species) on bare ground between sparse grasses (Crome, 1976; Frith, 1982).
Status	Vulnerable under the EPBC Act and the NC Act
Threats	Threats to Squatter Pigeon include habitat clearing and habitat degradation caused by the grazing of livestock such as cattle, changes in the fire regimes and infestation from weeds. Changes in hydrological regimes can also impact on the habitat of Squatter Pigeon as the distance to water sources may alter movement of this species through the landscape. Squatter Pigeon is a predominately a ground dwelling bird and will nest on the ground therefore livestock grazing and feral species such as goats, foxes, dogs and cats all pose a threat (Reis, 2012).
Potential distribution within Project (Rail) study area	**Rail corridor**: Squatter Pigeons were observed along the rail alignment during the field surveys for the EIS (GHD 2012a; GHD 2012b). These observations were typically in grassy, open eucalypt woodland habitats (GHD 2012b). The observation along the rail alignment occurred in the west section of the rail corridor near Gregory Development Road in an Acacia woodland or forest BVC. The potential habitat for Squatter Pigeon along the rail alignment includes areas surrounding Belyando River, Mistake Creek, Logan Creek and Diamond Creek (GHD 2012a). Potential habitat areas considered to be suitable habitat along the alignment include woodland and forest regional ecosystems excluding woodlands and forest that occur on land zone 7 (ironstone jump ups) and land zone 9 (undulating country on fine grained sedimentary rocks) (GHD 2012a). The extent of potential habitat for Squatter Pigeon in both the study

Threatened Species Management Plan – Squatter Pigeon (southern) (*Geophaps scripta scripta*)	
	area and the surrounding landscape is shown in **Appendix C.4**. **Quarries**: Squatter Pigeon was observed on two separate occasions in grassy eucalypt woodland on the Moray Quarry site (CDM Smith 2013a; CDM Smith 2013b). **Offsite Infrastructure:** Two Squatter Pigeons were heard calling from riparian woodlands within the study area. Additional birds were observed along Carmichael Road immediately south of the study area. The species is relatively ubiquitous throughout the local landscape and could conceivably occur anywhere within the Study Area. Despite this, the squatter pigeon is more likely to occur in and adjacent to areas of woodland and areas with a lower density of buffel grass, since these areas tend to have higher resource availability for the species. Habitat modelling for the species identified 87.1 ha of potential habitat within the study area (GHD, 2013).
Potential impacts from Project (Rail)	**Rail corridor:** Vegetation clearing for the construction of the Project (Rail) will impact on 145.7 ha of potential habitat for Squatter Pigeon. In general, the construction footprint and surrounding study area are not considered to support an 'important population' or 'habitat critical to the survival' of Squatter Pigeon. Thus vegetation clearing (and associated impacts) is not considered to constitute a significant impact to Squatter Pigeon (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: Vegetation clearing for the establishment and operation of the quarries will result in the clearing of habitat for Squatter Pigeon, however given the abundance of habitat in the surrounding area it is not likely to be a significant impact. The increase in vehicle movement throughout the quarry areas has the potential to impact on Squatter Pigeon through increasing the likelihood of road kill (CDM Smith 2013a; CDM Smith 2013b). **Offsite infrastructure**: The clearing associated with the offsite infrastructure will not result in the clearing of any potential habitat for the Squatter Pigeon. However, the Squatter Pigeon has been heard calling in the vicinity of the offsite infrastructure and seen to the south of the area. However, habitat degradation to both terrestrial and aquatic habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust is likely to occur. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the study area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor, quarries and offsite infrastructure**: • General mitigation and management measures outlined in **Section 3.1** • Locate where possible temporary and permanent infrastructure outside of potential Squatter Pigeon habitat (grassy woodlands mapped in **Appendix C.4**) within the construction footprint. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the

Threatened Species Management Plan – Squatter Pigeon (southern) (*Geophaps scripta scripta*)	
	clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • Clearing will be carried out in a sequential manner and in a way that directs escaping wildlife away from the construction footprint into adjacent habitat. • Suitable speed limits in place on access roads to reduce the level of road kill on Squatter Pigeon and other fauna species as a result of increased vehicle movement. • Restrict the use of barbed wire fencing or incorporate fencing with non-barbed top wire, especially near water sources. • All sightings of Squatter Pigeon or occupied nests should be reported to the Site Environmental Officer and verified by a qualified ecologist or licensed fauna spotter-catcher. Any injuries or death of Squatter Pigeon to be documented on the fauna register. • Rehabilitation of any potential Squatter Pigeon habitat would be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts would be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies.
Monitoring	A monitoring program will be developed and implemented for Squatter Pigeon. This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative abundance . Field survey of permanent monitoring sites would be undertaken using the Survey guidelines for Australia's threatened birds (DSEWPaC, 2010). • Monitoring of any occupied nests avoided during construction to monitor whether the species is completing its breeding cycle or abandoning the nest due to disturbance. A rehabilitation monitoring program would also be required for rehabilitated Squatter Pigeon habitat to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for Squatter Pigeon are carried out in accordance with the Survey guidelines for Australia's

Threatened Species Management Plan – Squatter Pigeon (southern) (*Geophaps scripta scripta*)	
	threatened birds (DSEWPaC, 2010). • No mortalities of Squatter Pigeon recorded in the register during construction. • No significant decline in Squatter Pigeon activity levels at permanent monitoring sites during and after construction. • No abandonment on young in occupied nests that have been avoided during construction. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Crome, F.H.J. (1976) Breeding, moult and food of the Squatter Pigeon in north-eastern Queensland. *Australian Wildlife Research* 3: 45-59. Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) (2010) *Survey guidelines for Australia's threatened birds,* Department of Sustainability, Environment, Water, Population and Communities, Canberra. Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) (2011a) *Geophaps scripta scripta in Species Profile and Threats Database*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed 16 May 2012. Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2011) *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual.* Version 2.1. Department of Environment and Resource Management (DERM), Biodiversity and Ecosystem Sciences, Brisbane. Frith, H.J. (1982) *Pigeons and Doves of Australia*. Rigby, Melbourne. Reis, T. (2012) Squatter Pigeon (Southern Subspecies). In Curtis, LK, Dennis, AJ, McDonald, KR, Kyne, PM & Drebus, SJS. *Queensland's threatened Animals*. CSIRO Publishing, Collingwood.

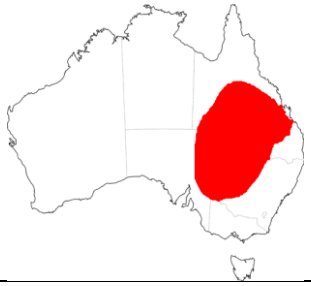
B.11 Koala (*Phascolarctos cinereus*)

Threatened Species Management Plan – Koala (*Phascolarctos cinereus*)	
Description	Koala is a marsupial that in 67 – 73 centimetres in length and weighs 4.2 – 9.1 kilograms. Overall koala has a short compact body, large head and ears without a functioning tail. They are covered with a dense fur that is brown to grey above with white patches, prominent black nose and large claws (Krockenberger et al., 2012).  Source: SKM
Known distribution	The distribution of Koala occurs form north Queensland to south-eastern South Australia and is strongly linked to the presence of eucalypt and some non-eucalypt food trees (Krockenberger et al., 2012).  Source: DSEWPaC, 2013
Habitat	Koalas preferred habitat is determined primarily by the presence of suitable food trees. Koalas feed on about 50 different species of Eucalyptus (Krockenberger et al., 2012). The quality of the food trees is the defining factor in the home ranges of individual koalas in good quality areas a home range for an individual can be 1-2 hectares while in less productive and arid areas the home range can be 100 hectares (Martin *et al.* 2008).
Breeding	Female Koalas first breed at 2 year of age and continue to breed normally every year until 10-12 years of age. Females commonly give birth to a single offspring with twins being extremely rare. The offspring remains in the mother's pouch for 6-8 months and continues to depend on its mother for 12 months. Once the off spring has left the pouch they will ride on the mothers back until fully weaned. The breeding season for Koala occurs between September and April with the birth of young being between October and May (Krockenberger et al., 2012)
Feeding	Koalas are primarily arboreal and spend the vast amount of their time in the canopy of large eucalyptus trees or other shade-trees. Koalas are known to move from one area or tree to another by coming to the ground, this includes crossing grass paddocks and roads. Koalas have a highly specialised diet of feeding exclusively on *Eucalyptus* leaves. They are known to eat approximately 400 grams of leaves a day. *Eucalyptus* leaves are a poor quality food source and this is the reason for the Koala's ability to spend up to 20 hours a day a sleep (Martin et al., 2008).
Status	Vulnerable under the EPBC Act (combined populations of Queensland, New South Wales and the Australian Capital Territory) and Least Concern under the NC Act (outside of south-east Queensland)
Threats	Koala is threatened by many causes with the most significant being habitat clearing and fragmentation. They are also threatened by domestic pets and feral predators especially dogs. In recent times Koala is becoming increasingly threatened by disease within populations that impacts of the reproductive of the species and overall survival of the individual animal. Changing fire regimes have both direct through the mortality of species during event and indirect impacts through the loss of suitable habitat. Koalas are also at risk from mortality from vehicle collisions that are common in fragment habitats and during the dispersal period of their lifecycle (Martin et al., 2008, Krockenberger et al., 2012).

Threatened Species Management Plan – Koala (*Phascolarctos cinereus*)	
Potential distribution within Project (Rail) study area	A single Koala was observed during the fauna surveys for the Mine within EPC 1080. This observation is 50 km south-west of the Moray Pit. During the surveys of the quarries no Koalas were directly observed. However it is noted that scratches consistent with Koalas were observed on the proposed Disney Quarry and Moray Pit (CDM Smith, 2013a).
Potential impacts from Project (Rail)	**Rail Corridor:** Vegetation clearing for the construction of the Project (Rail) will impact on 143.2 ha of potential habitat for Koala. In general, the construction footprint and surrounding study area are not considered to support an 'important population' or 'habitat critical to the survival' of Koala. Thus vegetation clearing (and associated impacts) is not considered to constitute a significant impact to Koala (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries**: Vegetation clearing for the establishment and operation of the quarries will result in the clearing of habitat for Koala on the Moray Pit and Disney Quarry, however it is not likely to be a significant impact on Koala. The increase in vehicle movement throughout the quarry areas has the potential to impact on Koala through increasing the likelihood of road kill. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 2.8 ha of potential habitat for Koala. Other likely impacts include habitat degradation to both terrestrial and aquatic habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the study area and some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail corridor, quarries and offsite infrastructure:** • General mitigation and management measures outlined in **Section 3.1** • Locate where possible temporary and permanent infrastructure outside of potential Koala habitat (eucalypt open forests and woodlands mapped in **Appendix C.5**) within the construction footprint. • Construction footprint to avoid Koala habitat trees (food and shelter trees) where possible. • 24 hours prior to clearing activities, a licenced fauna spotter-catcher will undertake pre-clearing surveys of potential Koala habitat (in particular food and shelter koala habitat trees) to check for presence of Koalas. • All clearing will be carried out in accordance with the sequential clearing procedures outlined in the Nature Conservation (Koala) Conservation Plan 2005 and Management Program 2006-2016 to encourage Koalas to relocate on their own accord into adjacent habitat. • A fauna spotter-catcher is not to physically move Koalas from a tree in which they are residing to another location. Should a Koala be found, each tree identified by the fauna spotter-catcher as being a risk to a Koala if felled, should not be felled, damaged or interfered with until the Koala has moved from the felling site of its own volition. The fauna spotter-catcher would monitor the animal to ensure that works in the wider area do not cause any stress to the animal. Once the animal has moved out of the area on its own accord then works may commence in the area. Koalas cannot be relocated unless the animal is in direct mortal danger or requires vet assistance. • Work areas will be inspected daily for fauna that may have become trapped before work commences each day, and fauna present to be relocated by a qualified fauna spotter-catcher. If any pits/trenches are to remain open after daily site works have been completed, they will be fenced, covered by an impenetrable barrier, or if possible, fauna ramps should be put in place to provide a potential means of

Threatened Species Management Plan – Koala (*Phascolarctos cinereus*)	
	escape for trapped fauna. • Suitable speed limits in place on access roads to reduce the level of road kill on Koala and other fauna species as a result of increased vehicle movement. • All sightings of Koala should be reported to the Site Environmental Officer and verified by a qualified ecologist. Any injuries or death of Koala to be documented on the fauna mortality register. • Rehabilitation of any potential Koala habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Install fauna underpasses (i.e. bridges, culverts) at key locations along the rail corridor where potential Koala habitat has been identified, including Belyando River, Mistake Creek, Logan Creek and Diamond Creek. Monitor the use of fauna underpasses after construction to assess utilisation by Koalas. • Any unavoidable impacts on Koala habitat will be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. • Pest animal management (in particular feral dogs).
Monitoring	Should any Koalas be found, a monitoring program would be developed and implemented to monitor impacts from the Project (Rail). This would include: • Installation of permanent monitoring sites at confirmed locations in known habitat areas. • Baseline surveys and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative abundance. Field survey of permanent monitoring sites would be undertaken using the *Koala interim referral advice for proponents* (DSEWPaC, 2012). A rehabilitation monitoring program would also be required for rehabilitated Koala habitat (i.e. eucalypt woodlands and forest) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for the Koalas are carried out in accordance with the *Interim koala referral advice for proponents* (DSEWPaC 2012). • No mortalities of Koalas recorded in the register during construction. • If Koala populations identified, no significant decline in Koala activity levels at permanent monitoring sites during and after construction. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal management, in particular feral dogs. • In areas of high road kill incidents provide lighting to these areas to minimise the risk of collision. • Provide offsets where there are no corrective actions for mitigation measures.
References	Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) (2012) *Interim koala referral advice for proponents*. Commonwealth Department of Sustainability, Environment, Water, Populations and Communities, Canberra Krockenberger, A., Gordon, G. and Dennis, D.J. (2012) Koala. In Curtis, LK, Dennis, AJ, McDonald, KR, Kyne, PM & Drebus, SJS, *Queensland's threatened Animals.* CSIRO Publishing, Collingwood. Martin, R.W., Handasyde, K.A. and Krockenberger, A. (2008) Koala. In Van Dyck & Strahan, R (3rd Edition), *The Mammals of Australia*. Reed New Holland Publishers, Sydney. Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) (2013) *Koala in Species Profile and Threats Database*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed 08/07/2013.

B.12 Little Pied Bat (*Chalinolobus picatus*)

Threatened Species Management Plan – Little Pied Bat (*Chalinolobus picatus*)	
Description	Little Pied Bat has a head-body length 42-50 mm and weighs 3-8 grams. They have a thick black fur on their backs that extends onto the tail membrane where the fur becomes more brownish. White to grey fur is common along the flanks forming a V-shape in the pubic region. The outer margin of short, broad ears terminates in a horizontal lobe at the corner of their mouths (Ford et al., 2008).  Source: SKM
Known distribution	Known to occur from the Greenvale region (north of Ingham to the Maryborough – Childers – Miriam Vale area. The distribution extends across south western Queensland and extending into western New South Wales and far northern South Australia (DSEWPaC, 2011). 
Habitat	They prefer dry open woodland communities throughout its range however it has also been recorded in dry sclerophyll forest and *Araucarian notophyll* vine forest in south-east Queensland. In the south-east and central coast of Queensland they occur in woodland dominated by *Corymbia citriodora*, *Eucalyptus moluccana*, *E. tereticornis* and ironbark species. In the central and western Darling Downs area of Queensland it has been predominantly recorded from *Callitris/Allocasuarina* dominated forests with scattered eucalypt emergent such as *E. dealbata* and *E. fibrosa* (DSEWPaC, 2011). Also known to occur in areas that have high ephemeral surface water, however they are known to travel long distances to forage and drink (Ford et al., 2008). Little Pied Bats are known to roost alone or in groups, with a record of a colony of 40 individuals recorded. They are known to roost in old buildings, hollow trees, and caves.
Breeding	Breeding for this species is likely to begin in early spring with pregnant females observed from mid-September. Females give birth to 1-2 young in late spring (November). Females will leave their offspring in a crèche while they forage for food. The juveniles leave the parental roost in early March (Ford et al., 2008).
Feeding	Their diet like most micro bats consists of insects. These bats have been to travel 14-34 km from their roosting site (Ford et al., 2008).
Status	Not listed under the EPBC Act. Near Threatened under the NC Act.
Threats	Little Pied Bat is threatened by the destruction of their roosts through habitat clearing. They are also impacted by habitat fragmentation that exposed them to predators as the search for food and water resources through the landscape. Barbed wire fencing especially near water bodies are also a threat to the bats as they come in for drink and risk being caught on the fencing. Another threat that impacts on Little Pied Bat is the lack of information and understanding in the ecology and biology of this species (Ford et al., 2008, DSEWPaC, 2011).
Potential distribution within Project (Rail) study area	Little Pied Bat was recorded in four separate locations throughout the Mine and Rail study areas, three of which were in forest habitats adjacent to the Belyando River and Diamond Creek (GHD 2012a, 2012b).

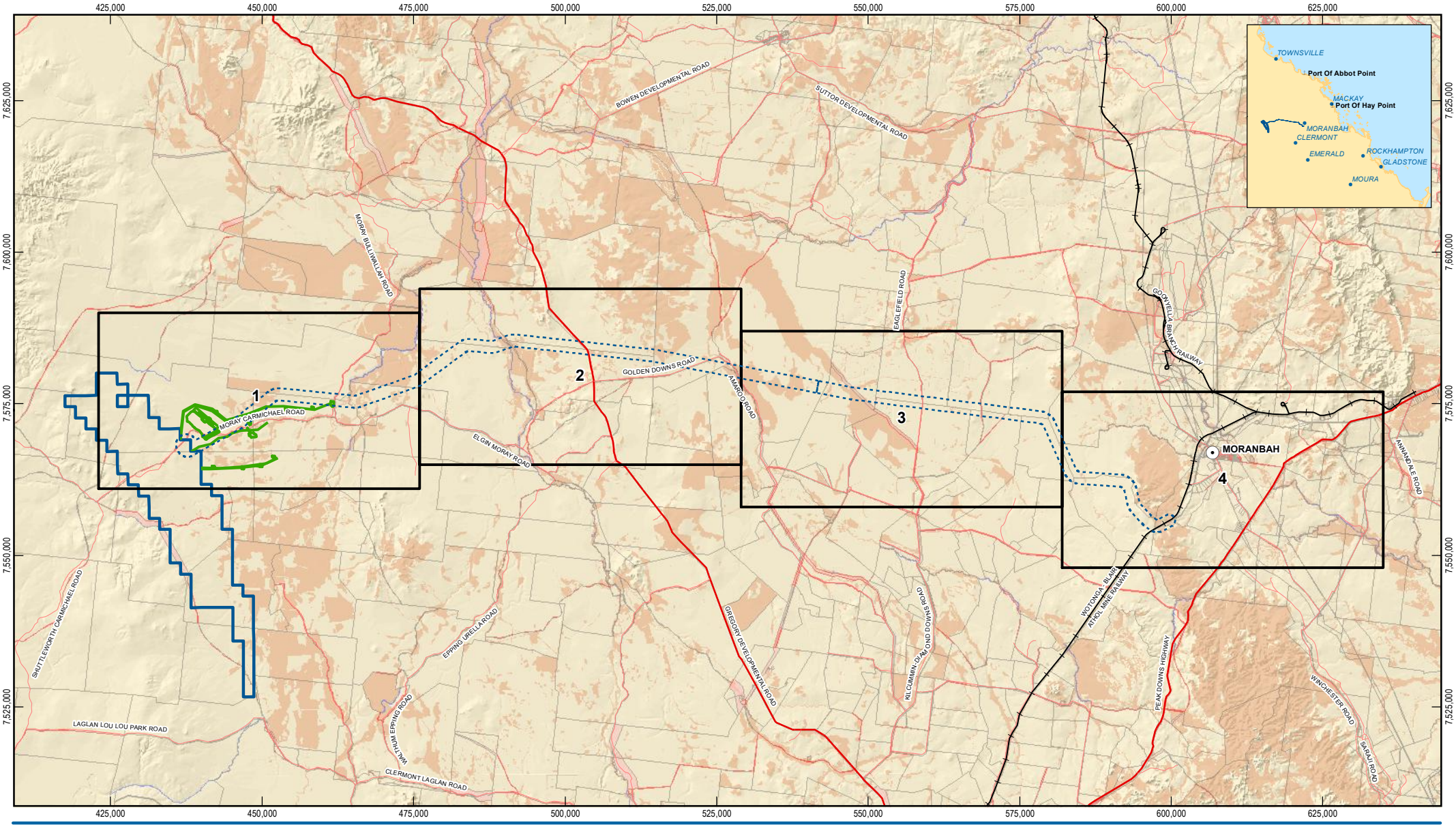
Threatened Species Management Plan – Little Pied Bat (*Chalinolobus picatus*)	
Potential impacts from Project (Rail)	**Rail Corridor:** Vegetation clearing for the construction of the Project (Rail) will impact on 145.7 ha of potential habitat for Little Pied Bat. In general, the construction footprint and surrounding study area are not considered to support an 'important population' or 'habitat critical to the survival' of Little Pied Bat. Thus vegetation clearing (and associated impacts) is not considered to constitute a significant impact to Little Pied Bat (GHD, 2012a). Vegetation clearing has the potential to result in habitat degradation of adjacent and downstream habitats, including edge effects, temporary localised increases in noise, vibration and artificial light disturbance and erosion and sedimentation of waterways. In consideration of the relatively localised nature and short-term duration of impacts associated with construction and with the implementation of mitigation measures, impacts on fauna are not expected to be adverse or long-term (GHD, 2012a). Vegetation clearing also may result in localised fragmentation of habitat in the vicinity of the construction footprint. In consideration of the present fragmented nature of the study area and with the implementation of mitigation measures, impacts on fauna are considered to be localised (GHD, 2012a). **Quarries:** Vegetation clearing associated with establishment and operation of the quarries and associated tracks for vehicles will result in loss of areas considered to be potential habitat for the Little Pied Bat. However, the species has not been located at the quarries, so the loss of vegetation it is unlikely to have a significant impact on the Little Pied Bat. **Offsite infrastructure**: The clearing associated with the offsite infrastructure will result in the loss of 4.5 ha of potential habitat for Little Pied Bat. In addition to the habitat loss the other impacts that are likely to occur due to the works are habitat degradation to both terrestrial and aquatic habitats through increased pest and weed pressures, increased edge effects and increased anthropogenic pressures such as light, noise and dust. The combination of the habitat clearing and degradation of habitats will also increase the level of fragmentation throughout the area as some habitat patches may become unsuitable for this species.
Mitigation and management measures	**Rail Corridor:** • General mitigation and management measures outlined in **Section 3.1** • Restrict the use of barbed wire fencing particularly near watercourses and water bodies; where fencing is required use non-barbed top wire. • Locate where possible temporary and permanent infrastructure outside of potential Little Pied Bat habitat (open forests and woodlands) within the construction footprint. • Construction footprint to avoid mature, hollow-bearing trees where possible. • Where possible schedule clearing activities to be timed to avoid the main early Spring to late Summer breeding season of Little Pied Bat. • Where possible schedule the clearing to be outside the main breeding season of applicable species. • Pre-clearing surveys will conducted in the following staged approach to minimise impacts on breeding species: - Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. - 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates. • Where possible avoid tampering with habitat and breeding places (i.e. nests, hollows, burrows) by

Threatened Species Management Plan – Little Pied Bat (*Chalinolobus picatus*)	
	allowing the breeding cycle to complete i.e. buffer zones to allow young to vacate the breeding place, and to ensure that clearing adjacent to a buffer zone does not directly impact the area within the buffer. This will only be practical where active breeding places are located in close proximity to the edge of the corridor. • Take care where an active breeding place is found and unable to be avoided, the eggs/young from the breeding place will be removed by a licensed fauna spotter-catcher and given to a wildlife carer. • Relocate inactive breeding places will be removed and relocated by a licensed fauna spotter-catcher into adjacent habitat. • Outside breeding season, if individuals are found, they can be removed by a licensed and experienced bat spotter-catcher and stored in calico bags until they can be released during dusk the same day. • Hollow-bearing trees that are removed will be offset with nest boxes to compensate the loss of hollows. The number and type of nest boxes required will be determined during the pre-clearing surveys based on the number and size of the hollows that would be removed, the occupancy rates of hollows and the target species inhabiting the area. A nest box management plan will be required detailing specifications for nest box dimensions, location of nest boxes, installation requirements and ongoing monitoring and maintenance. Half of the nest boxes should be installed as soon as possible prior to or during the clearing works to provide temporal refuge habitat for hollow-dependent fauna displaced during clearing activities. The remaining nest boxes would be installed once a final count of functional trees hollows has been compiled on completion of the clearing supervision. • If clearing of the tree is unavoidable, then the soft-felling technique would be utilised for the relocation of the roost feature. This involves inspection of the tree by an arborist, felling of the tree in sections and carefully lowering the limbs to the ground. Cuts should be made at least 50 cm from the roost feature. The felled limb with the roost feature should be relocated into adjacent habitat at a similar height. • The bat spotter-catcher should be present during the felling operations. Should any bats be encountered during the felling operations, all works and activity must cease immediately and the bat spotter-catcher should catch and store the bats in calico bags and either released during dusk the same day if they are believe this is safe for the bats, or otherwise given to a wildlife carer. • Develop a nest box management plan for Little Pied Bats to compensate removal of hollow-bearing trees. • Installation of nest boxes for hollow-roosting microbats prior to clearing (as soon as possible after project approval) in accordance with nest box management plan. • Ensure that construction work areas do not afford habitat value to fauna (i.e. open roof cavities, material stockpiles). Entrances to any such areas should be barricaded to exclude entry/habitation by fauna. • All sightings of Little Pied Bat or roosts should be reported to the Site Environmental Officer and verified by a qualified ecologist. Any injuries or death of Little Pied Bat to be documented on the fauna mortality register. • Rehabilitation of any potential Little Pied Bat habitat will be undertaken as soon as possible after cleared areas are no longer required (areas outside of the rail corridor). • Any unavoidable impacts will be assessed by a qualified ecologist and offset in accordance with Commonwealth and State offset policies. **Quarries:** • Pre-clear surveys for Little Pied Bat and roosts will be undertaken by a qualified ecologist within potential Little Pied Bat roost habitat (tree hollows, caves) near the quarries prior to the commencement of clearing and quarrying activities to confirm presence and inform management measures. Field survey of potential habitat will be undertaken using the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • Should any roosts be found, a buffer zone around the tree should be cleared demarcated and flagged / fenced off. Quarrying and associated activities should avoid these areas until the roost has been vacated (due to the specific nature of roost selection).

Threatened Species Management Plan – Little Pied Bat (*Chalinolobus picatus*)	
Monitoring	A monitoring program will be developed and implemented for Little Pied Bat. This would include: • Installation of permanent monitoring sites at known habitat areas. • Baseline surveys and annual monitoring during and after construction for a minimum of three years to assess ongoing presence/absence and relative abundance . Field survey of permanent monitoring sites would be undertaken using the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • Monitoring of any soft-felled tree limbs with roosts that have been relocated into adjacent habitat. • Monitoring of nest boxes for use by Little Pied Bats. A rehabilitation monitoring program would also be required for rehabilitated Little Pied Bat habitat (i.e. open forests and woodlands) to assess success against target revegetation criteria. Monitoring would occur 1-2 years after establishment using the BioCondition assessment methodology (Eyre et al., 2011).
Performance indicators	• Audit demonstrating implementation of the mitigation and management measures proposed. • Surveys for the Little Pied Bat are carried out in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2012). • No mortalities of Little Pied Bat recorded in the register during construction. • If Little Pied Bat populations identified, no significant decline in Little Pied Bat activity levels at permanent monitoring sites during and after construction. • Uptake of nest boxes by roosting Little Pied Bats. • No abandonment of young in relocated roosts. • Improvement in measurements of site-based vegetation attributes over-time against revegetation criteria developed for rehabilitation areas.
Corrective actions	• Review monitoring methods, considering further monitoring and assessment should there be a decline in activity levels. Consider potential for natural variation to be responsible for decline in activity levels. • Investigate habitat adjoining the rail corridor and consider improving habitat condition and connectivity. • Undertake rehabilitation maintenance, i.e. replanting, fertiliser treatment, erosion control, weed control. • Undertake pest animal control if required in known habitat areas. • Provide offsets where there are no corrective actions for mitigation measures.
References	Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) (2011). *The Action Plan for Bat*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/action/bats/21.html. Accessed 16 May 2012. Eyre, T.J., Ferguson, D.J., Hourigan, C.L., Smith, G.C., Mathieson, M.T., Kelly, A.L., Venz, M.F. and Hogan, L.D. (2012) *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland.* Department of Science, Information Technology, Innovation and the Arts, Queensland Government, Brisbane. Ford, G.I., Pennay, M., Young, R.A. and Richards, G.C. (2008) Little Pied Bat. In Van Dyck & Strahan, R (3rd Edition), *The Mammals of Australia*. Reed New Holland Publishers, Sydney.

Appendix C. Threatened species sightings and potential habitat mapping

C.1 Ornamental Snake



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Kilometres

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Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- State Road
- Local Road
- Other Railway
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Mine (Onsite)
- Mine (Offsite)
- Study Area
- Potential Ornamental Snake Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Ornamental Snake Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-11
Series Index

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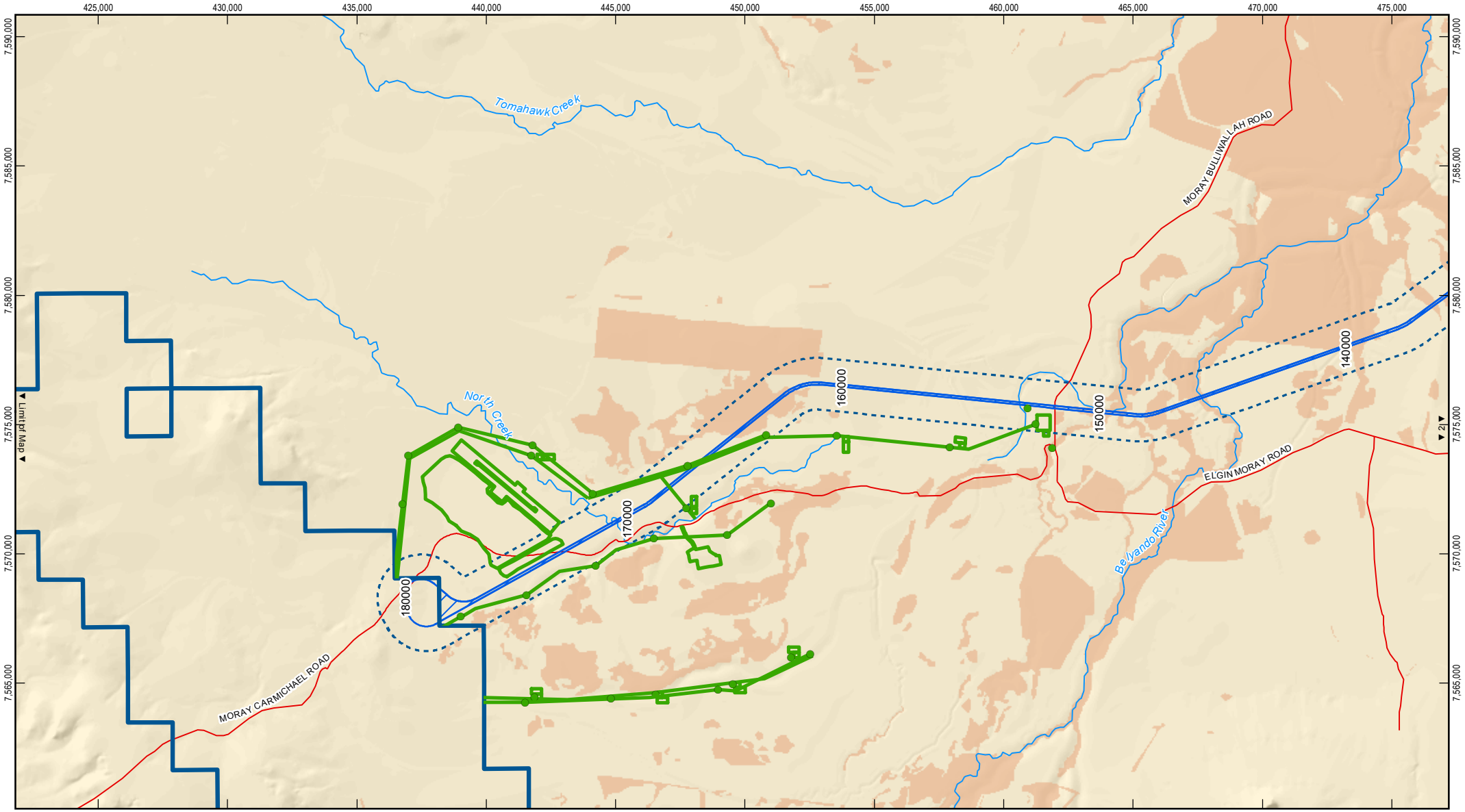
Data source: DERM: DEM (2008), DCDB (2010); DME: EPC1690 (2010)/EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads (2007); Adani: Alignment Opt9 Rev3 (2012); GHD: Potential Habitat (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: BW, CA



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Kilometres

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Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Ornamental Snake Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

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Carmichael Coal Mine and Rail Project

Potential Ornamental Snake Habitat Within the Study Area and Surrounding Landscape

Job Number	41-25215
Revision	B
Date	11-09-2012

Figure 5-11
Sheet 1 of 4

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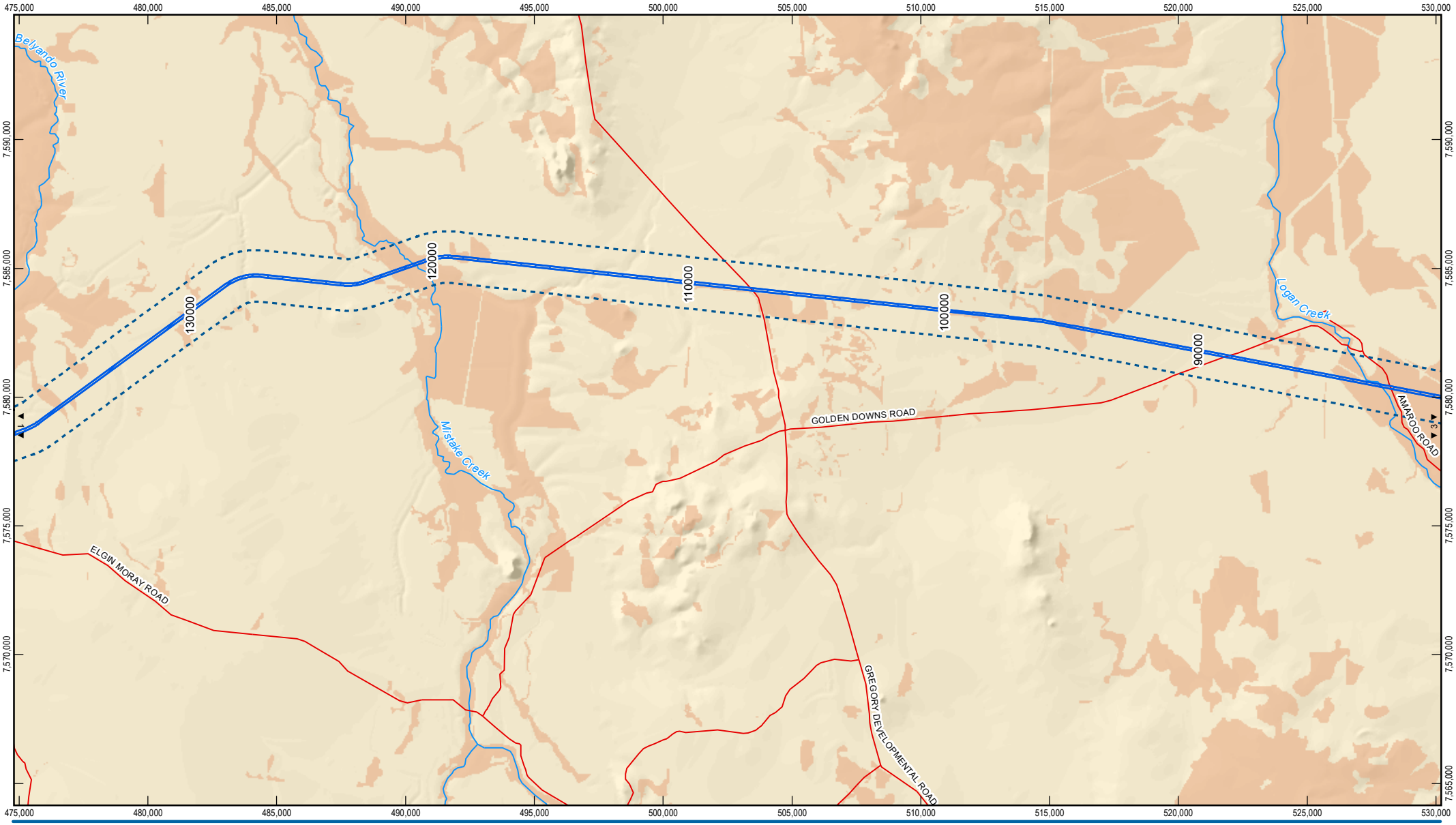
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Ornamental Snake Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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Kilometres

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Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

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LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
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- Rail (East)
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Carmichael Coal Mine and Rail Project

Potential Ornamental Snake Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-11
Sheet 2 of 4

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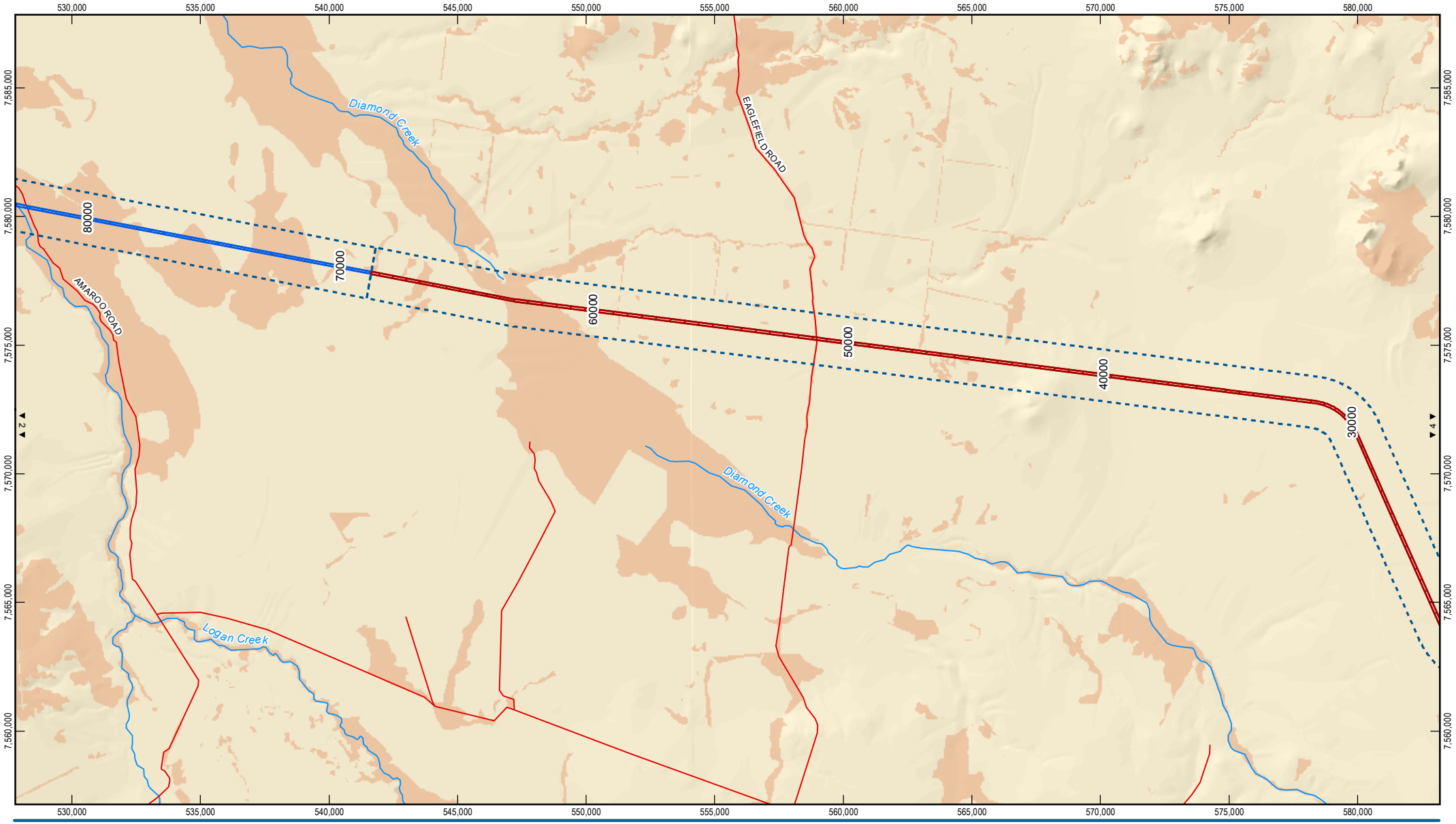
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Ornamental Snake Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Ornamental Snake Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

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Potential Ornamental Snake Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-11
Sheet 3 of 4

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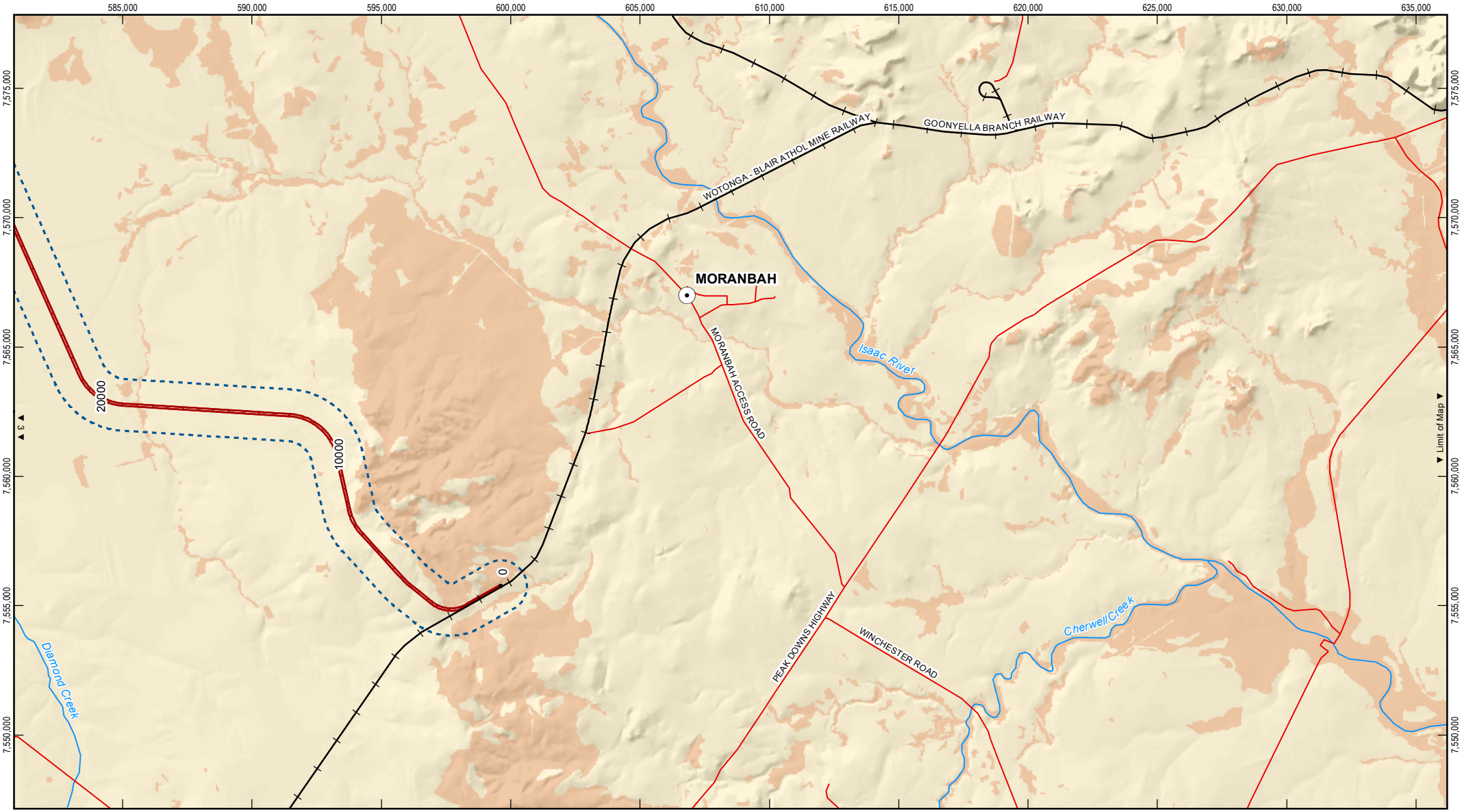
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Ornamental Snake Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Ornamental Snake Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

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Carmichael Coal Mine and Rail Project

Potential Ornamental Snake Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-11
Sheet 4 of 4

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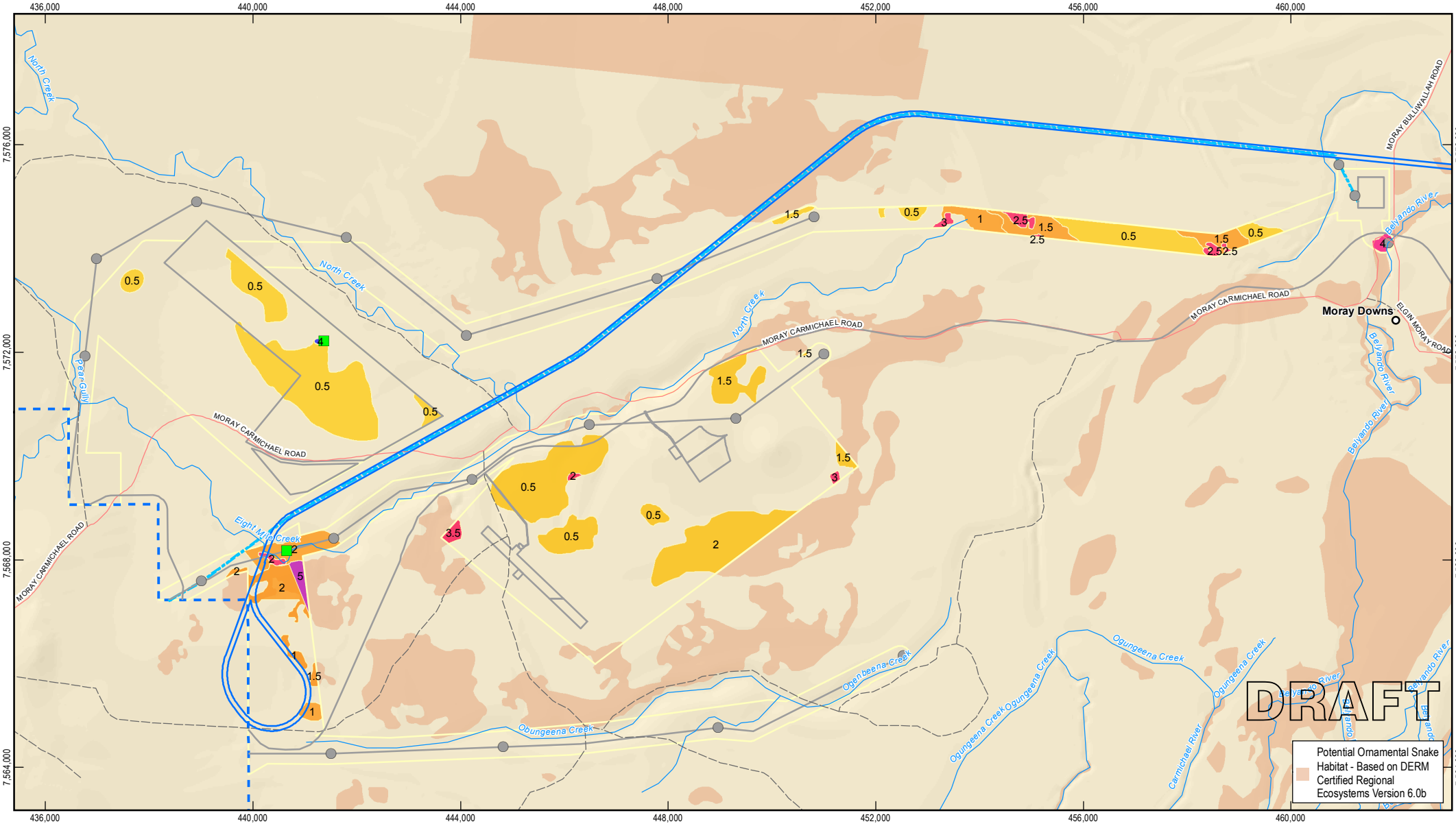
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Ornamental Snake Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Homestead
- Confirmed Location of Ornamental Snake
- Local Road
- Track
- Watercourse
- Rail Corridor
- Water Supply Pipeline
- Study Area
- Project Area
- Mine (Offsite)
- Mine (Offsite)

Habitat Value: 1, 2, 4, 6, 7, 8

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Environmental Assessment Report

Distribution of Potential Habitat for the Ornamental Snake within the Study Area

Figure 11

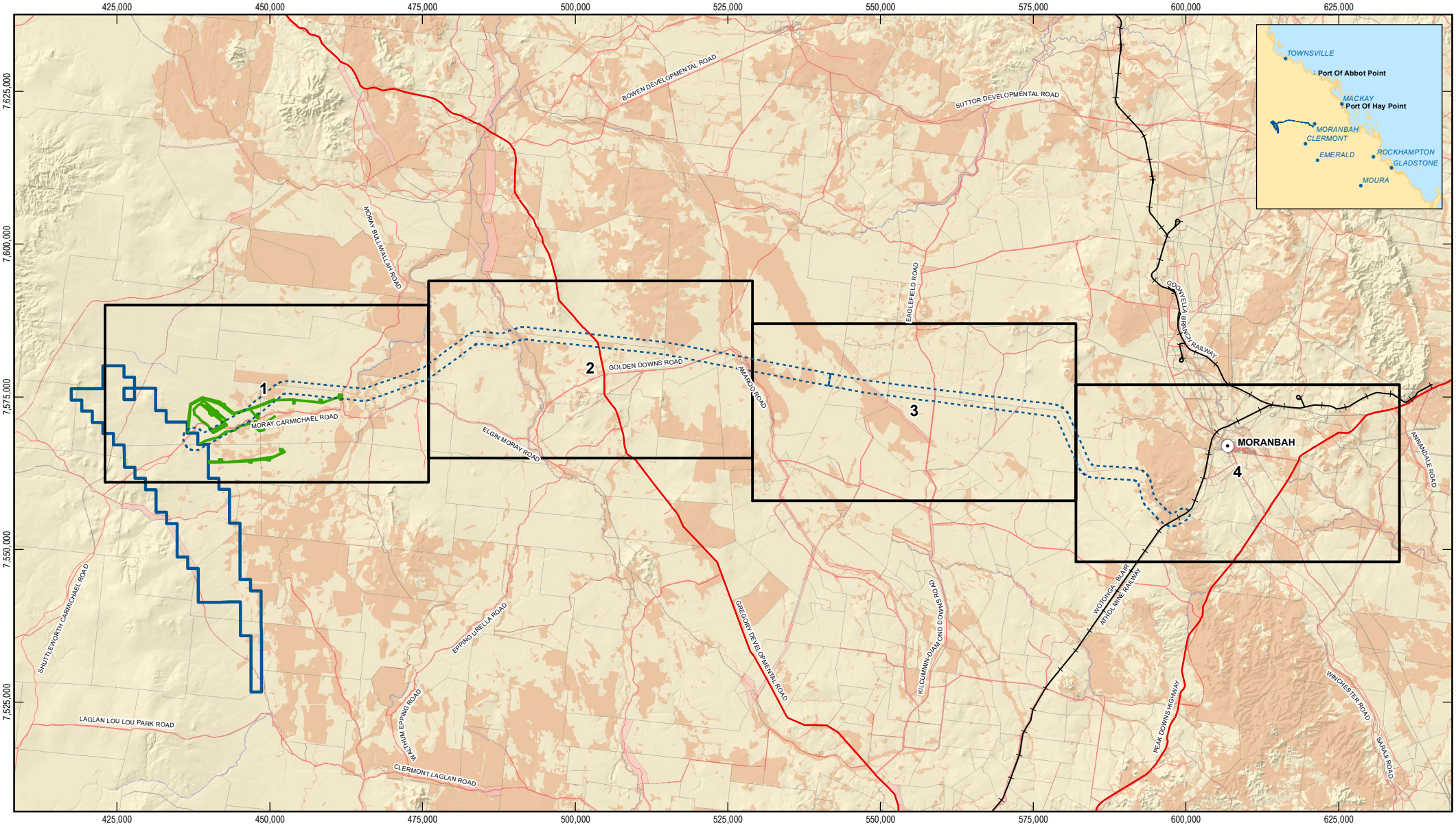
Job Number	41-26422
Revision	B
Date	27-06-2013

G:\41\26422\GIS\Maps\MXD\Environmental_Assessment_Report\41-26422_3009_rev_b.mxd

Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DME: EPC1690 (2010)/EPC1080 (2011); DNRM: Potential Habitat (2011); GHD: Confirmed Sightings (2013), Habitat Value (2013); © Commonwealth of Australia (Geoscience Australia): Watercourse, Tracks (2007); Adani: Alignment Opt11 Rev 2 (SP1 and 2)(2013), Offsite Infrastructure (2013); Gassman/Hyder: Mine (Offsite) Moray Carmichael Road Realignment (Opt 2) (2013). Created by: AJ. Created by: MS

C.2 Yakka Skink



1:850,000 (at A4)

0 5 10 15 20 25

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- State Road
- Local Road
- Other Railway
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Mine (Onsite)
- Mine (Offsite)
- Study Area
- Potential Yakka Skink Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Potential Yakka Skink Habitat Within the Study Area and Surrounding Landscape

Job Number	41-25215
Revision	B
Date	14-09-2012

Figure 3-5
Series Index

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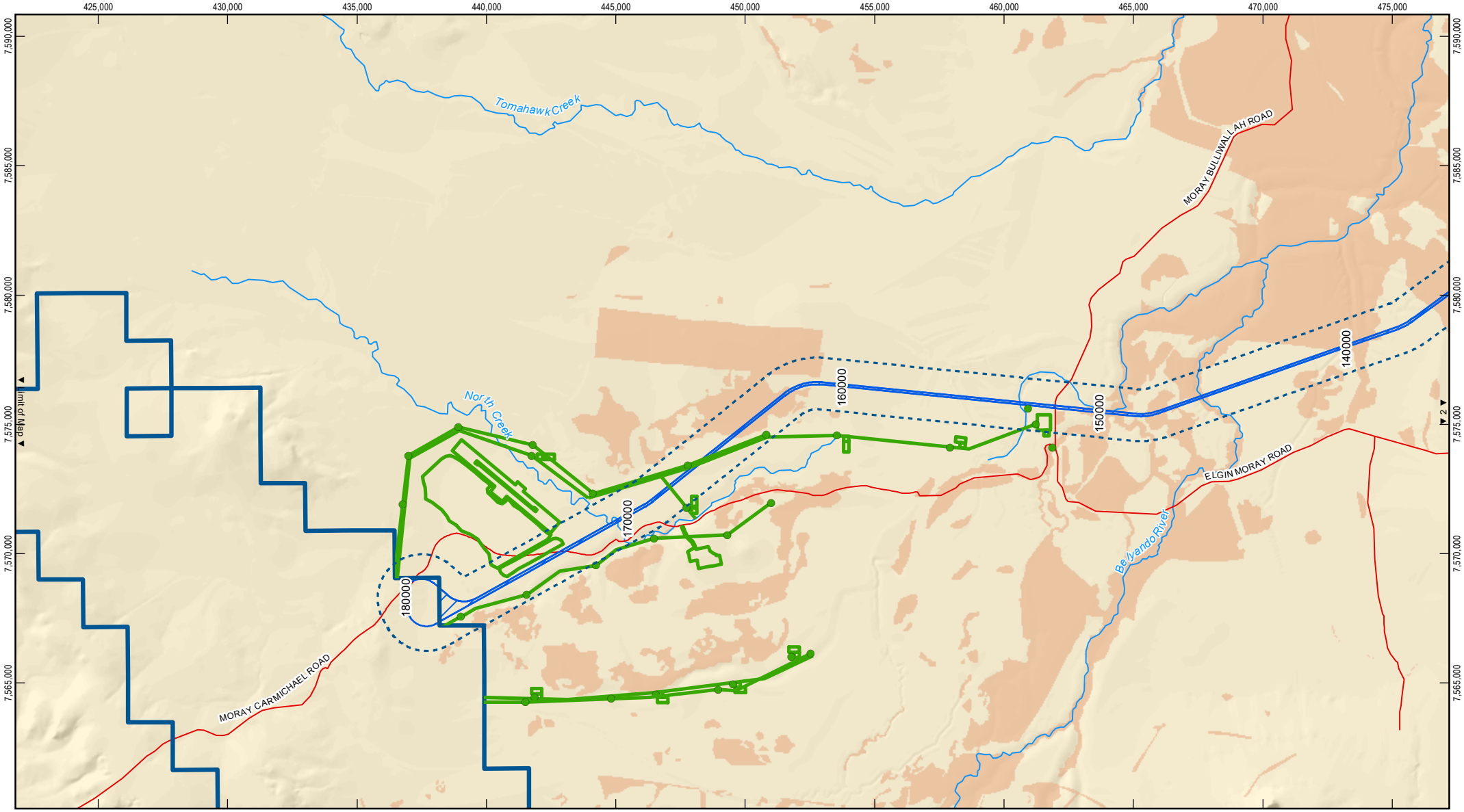
Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), DCDB (2010); DME: EPC1690 (2010)/EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads (2007); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012); GHD: Potential Habitat (2011). Created by: BW, CA



1:200,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Yakka Skink Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Yakka Skink Habitat Within the Study Area and Surrounding Landscape

Job Number	41-25215
Revision	B
Date	14-09-2012

Figure 3-5
Sheet 1 of 4

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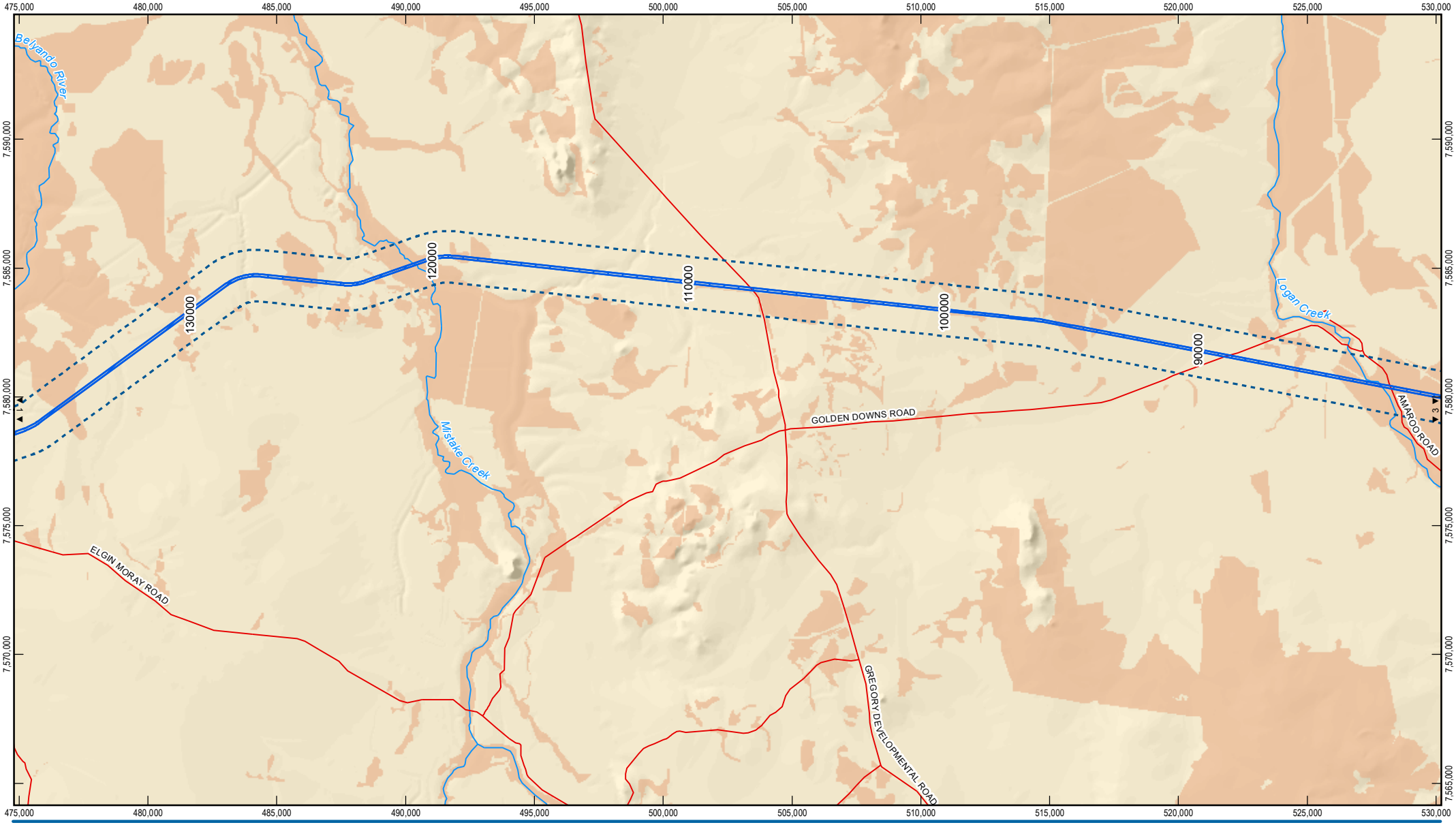
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Yakka Skink Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



1:200,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Yakka Skink Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Yakka Skink Habitat Within the Study Area and Surrounding Landscape

Job Number	41-25215
Revision	B
Date	14-09-2012

Figure 3-5
Sheet 2 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_463_200k_rev_b.mxd

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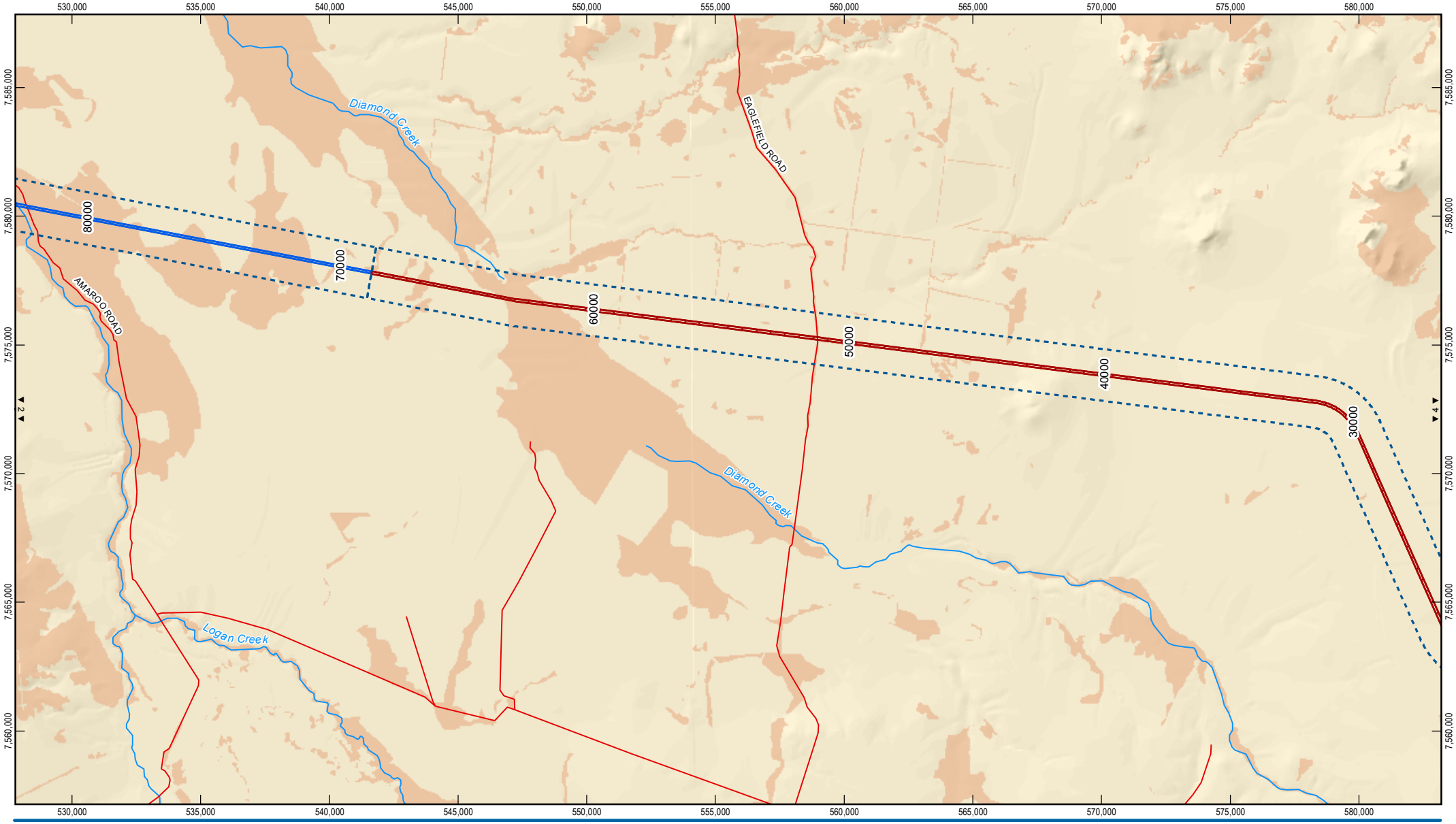
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Yakka Skink Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



1:200,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Yakka Skink Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Yakka Skink Habitat Within the Study Area and Surrounding Landscape

Job Number	41-25215
Revision	B
Date	14-09-2012

Figure 3-5
Sheet 3 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_463_200k_rev_b.mxd

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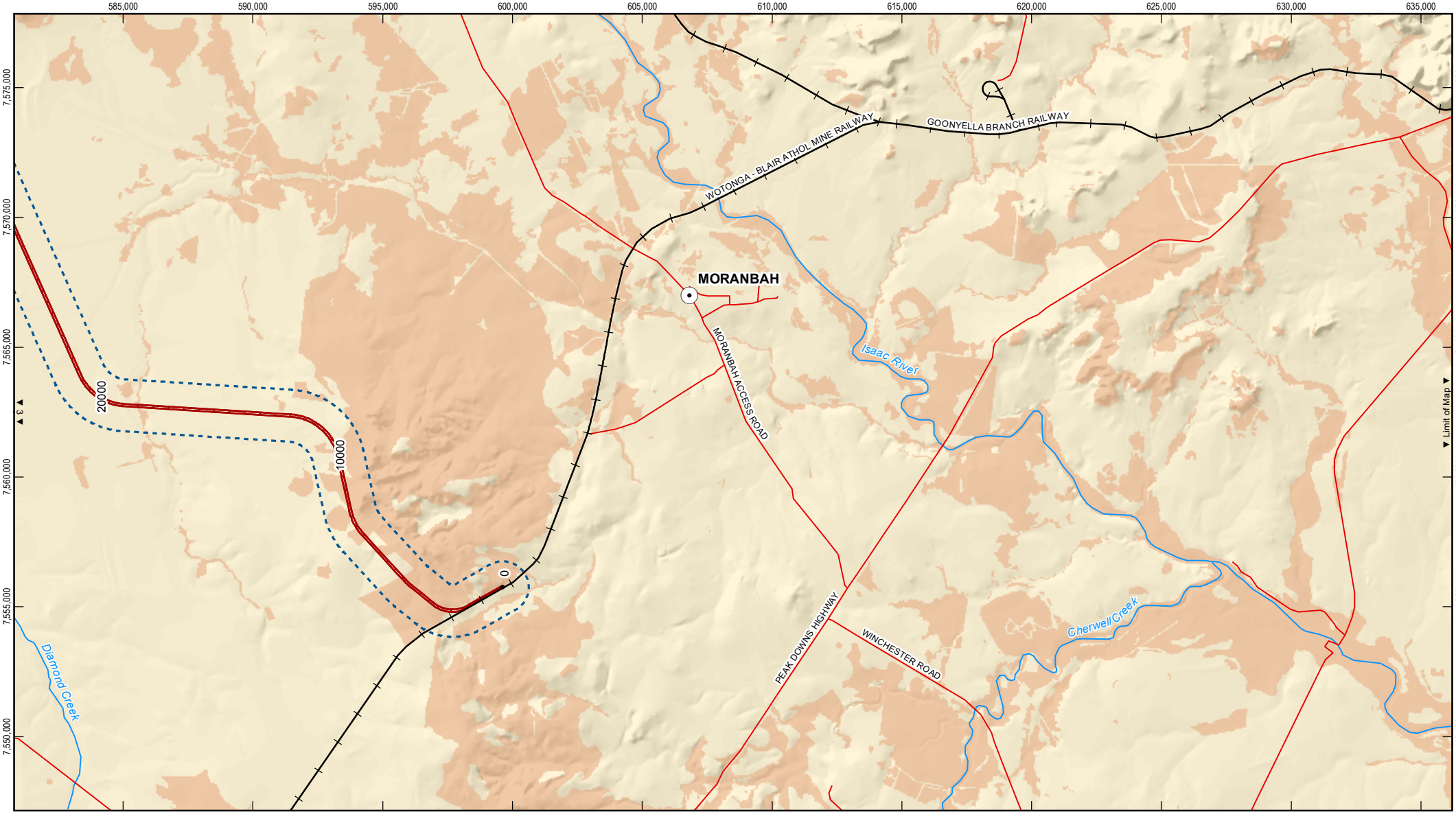
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Yakka Skink Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



1:200,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Yakka Skink Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Yakka Skink Habitat Within the Study Area and Surrounding Landscape

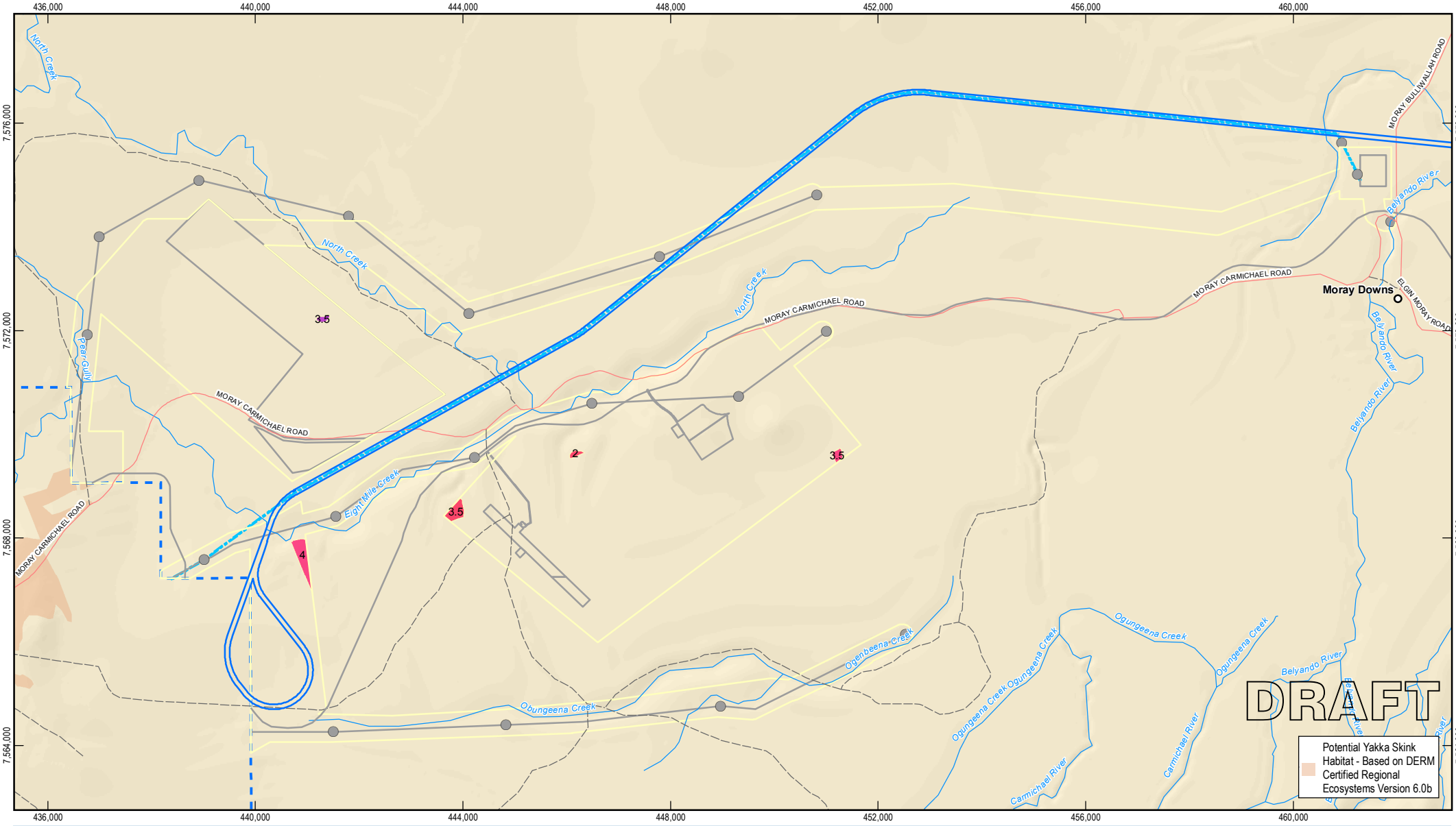
Job Number 41-25215
Revision B
Date 14-09-2012

Figure 3-5
Sheet 4 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_463_200k_rev_b.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Yakka Skink Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



1:100,000 (at A4)

0 2 4

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Homestead
- Local Road
- Track
- Watercourse
- Rail Corridor
- Water Supply Pipeline
- Study Area
- Project Area
- Mine (Offsite)
- Mine (Offsite)

Habitat Value
4
5
7

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Environmental Assessment Report

Distribution of Potential Habitat for the Yakka Skink within the Study Area

Job Number 41-26422
Revision A
Date 27-06-2013

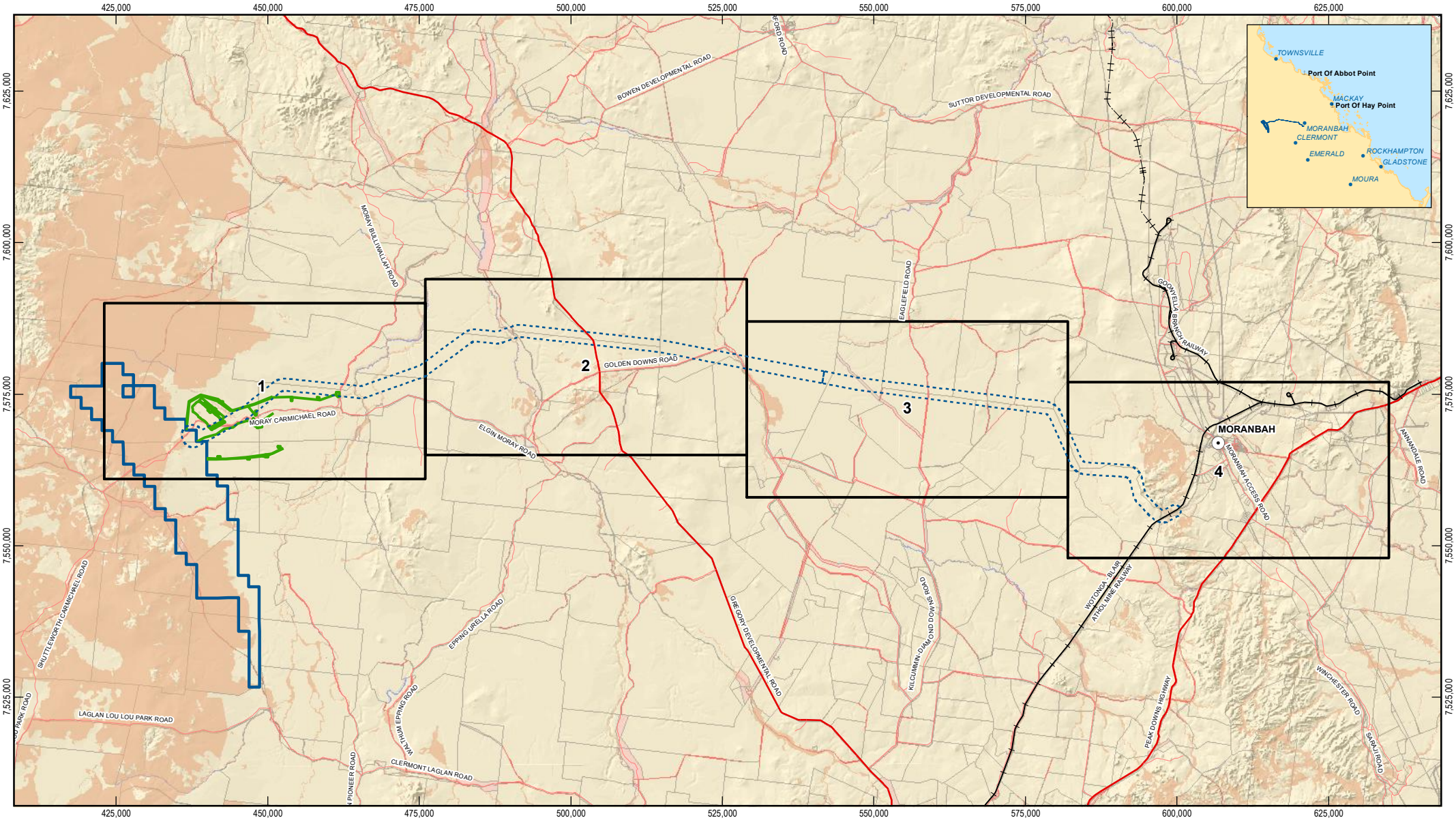
Figure 15

G:\41\26422\GIS\Maps\MXD\Environmental_Assessment_Report\41-26422_3013_rev_a.mxd

Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DME: EPC1690 (2010)/EPC1080 (2011); DNRM: Potential Habitat (2011); GHD: Habitat Value (2013); © Commonwealth of Australia (Geoscience Australia): Watercourse, Tracks (2007); Adani: Alignment Opt11 Rev 2 (SP1 and 2)(2013), Offsite Infrastructure (2013); Gassman/Hyder: Mine (Offsite) Moray Carmichael Road Realignment (Opt 2) (2013). Created by: AJ. Created by: MS

C.3 Black-throated Finch



1:850,000 (at A4)

0 5 10 15 20 25

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- State Road
- Local Road
- Other Railway
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Mine (Onsite)
- Mine (Offsite)
- Study Area
- Potential Black-Throated Finch (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Location of Black-throated Finch Sightings and Potential Black-throated Finch (southern) Habitat within the Study Area and the Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-13
Series Index

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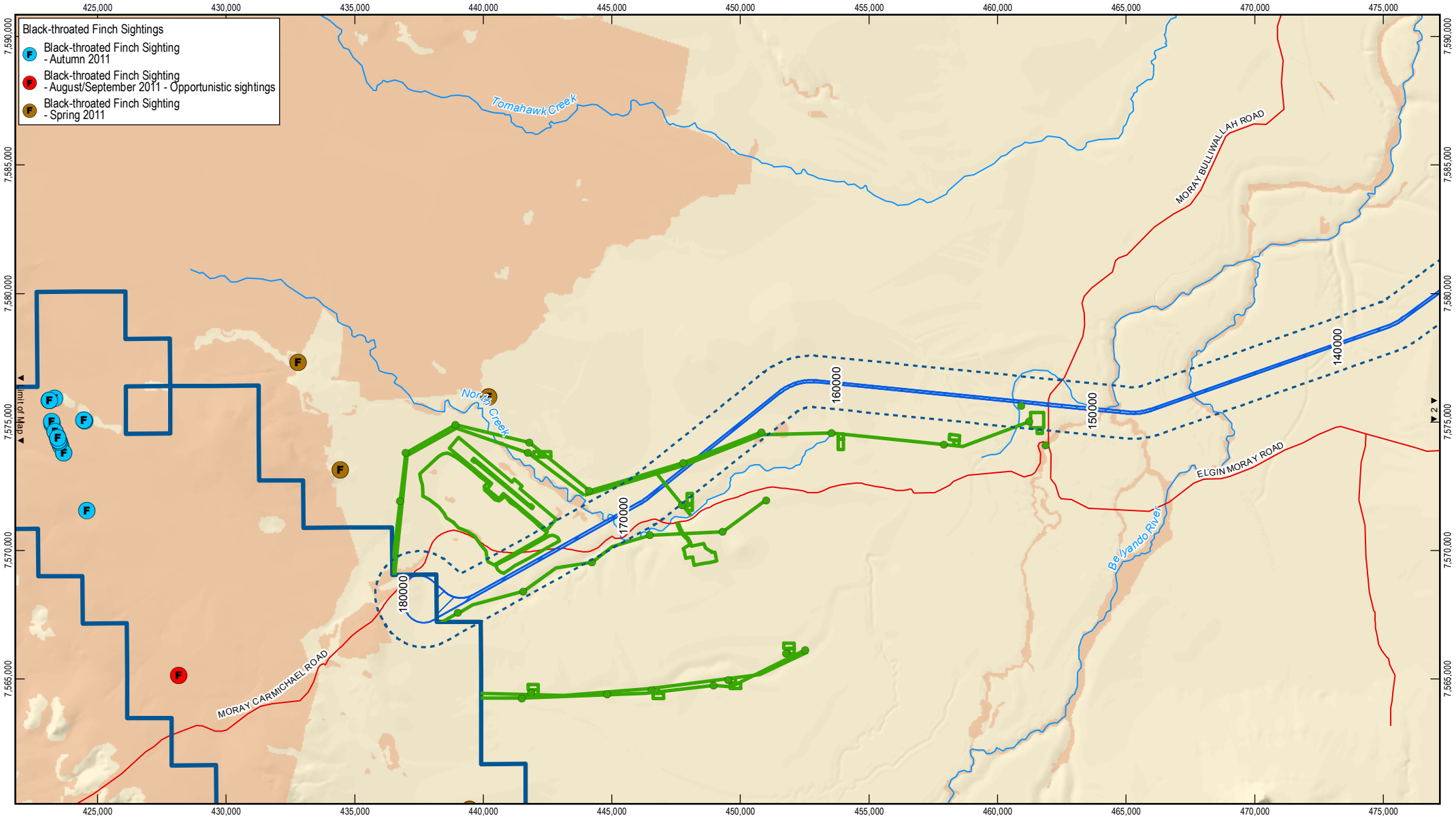
Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), DCDB (2010); DME: EPC1690 (2010)/EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads (2007); GHD: Potential Black-throated Finch Habitat, Sightings (2011); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012). Created by: BW, CA



1:200,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Black-Throated Finch (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Black-throated Finch (southern) Habitat at the Rail Study Area and the Surrounding Landscape

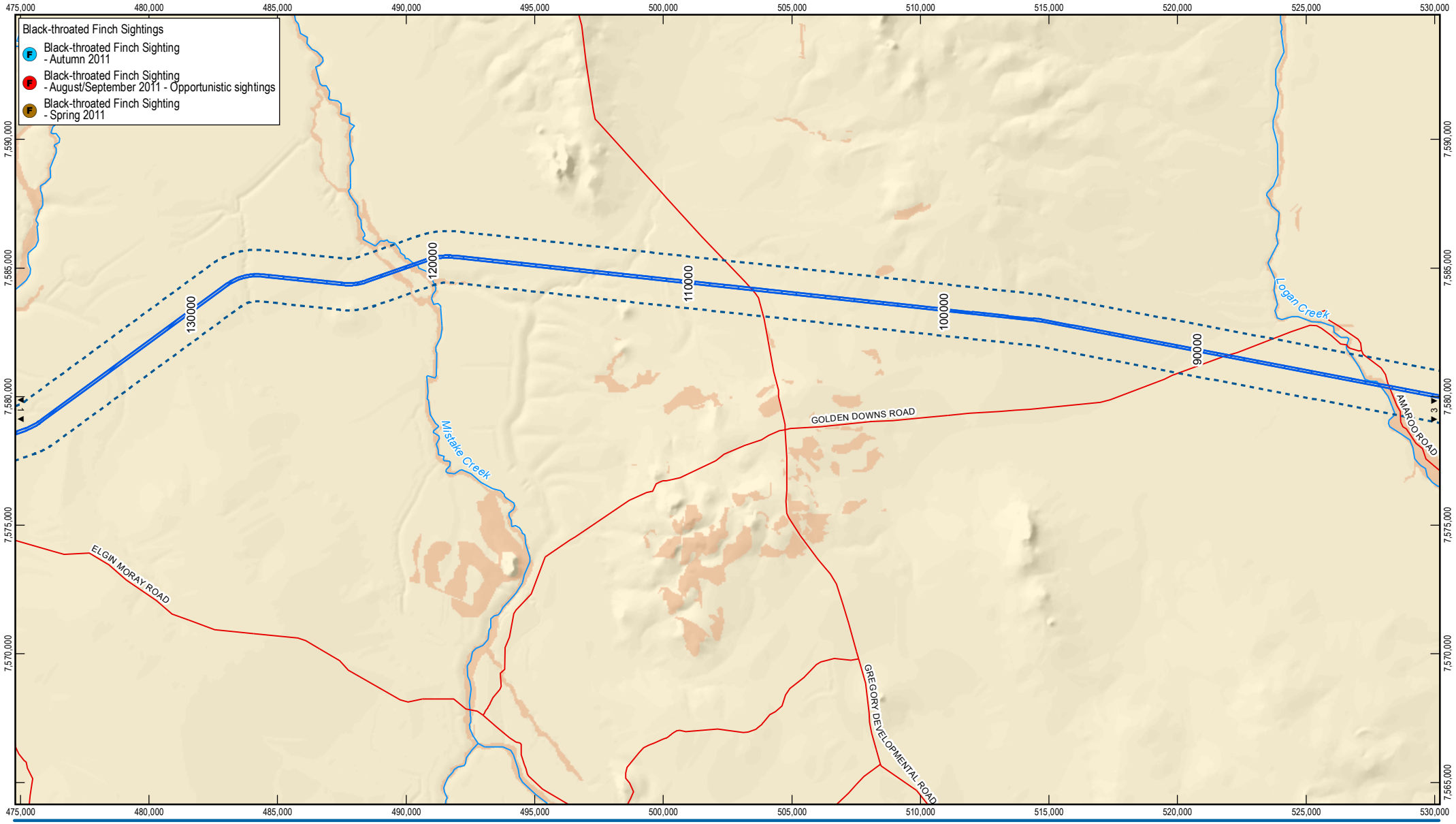
Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-13
Sheet 1 of 4

G:\41\25515\GIS\Maps\MXD\400_Ecology\41-25215_460_200k_rev_b.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Black-throated Finch Habitat, Sightings (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND
Town
Road
Other Railway
Watercourse
Mine (Onsite)
Mine (Offsite)
Mine (Offsite)
Rail (West)
Rail (East)
Study Area
Potential Black-Throated Finch (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

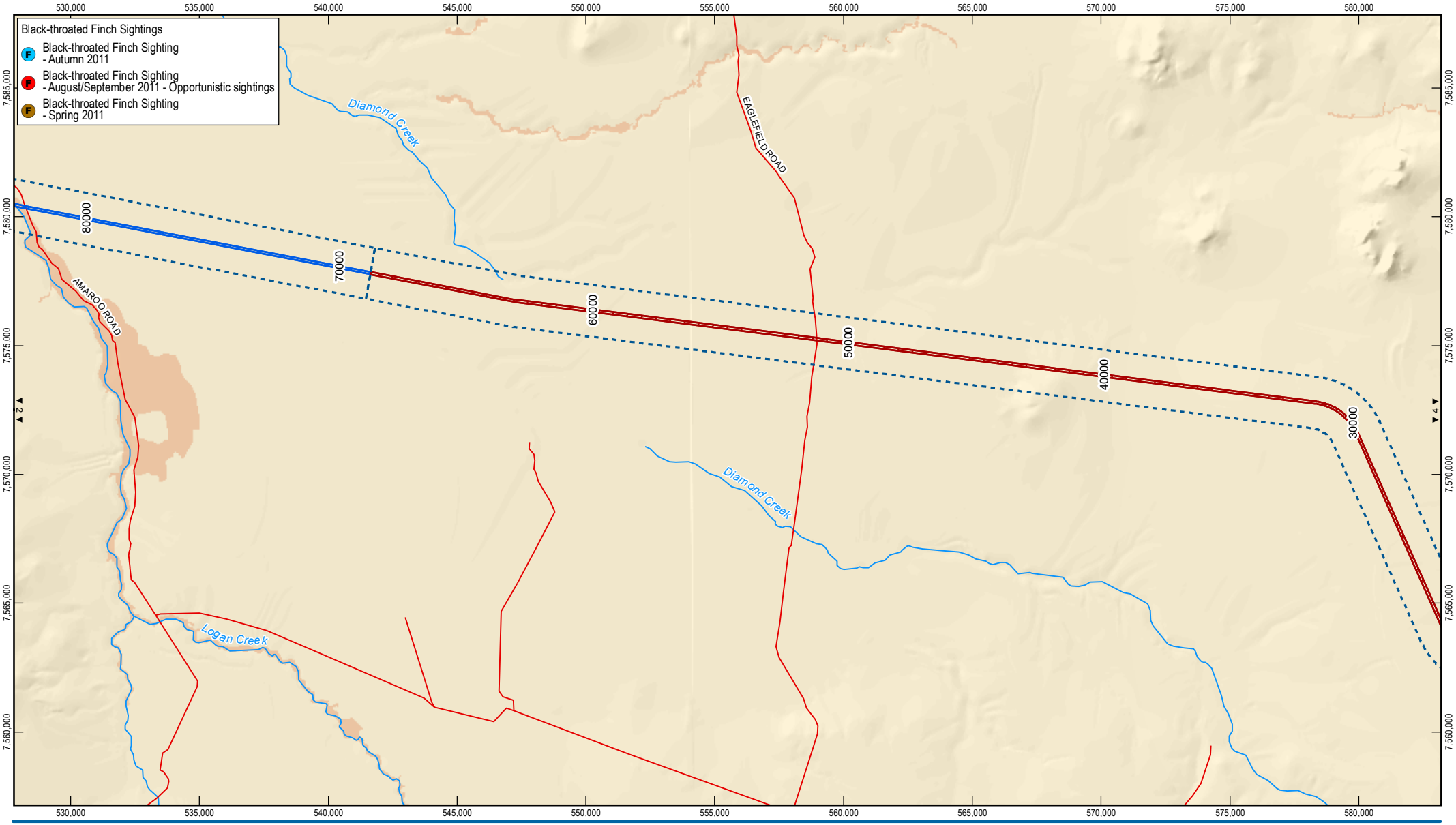
Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project
Potential Black-throated Finch (southern) Habitat at the Rail Study Area and the Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-13
Sheet 2 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_460_200k_rev_b.mxd
Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Black-throated Finch Habitat, Sightings (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Black-Throated Finch (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Black-throated Finch (southern) Habitat at the Rail Study Area and the Surrounding Landscape

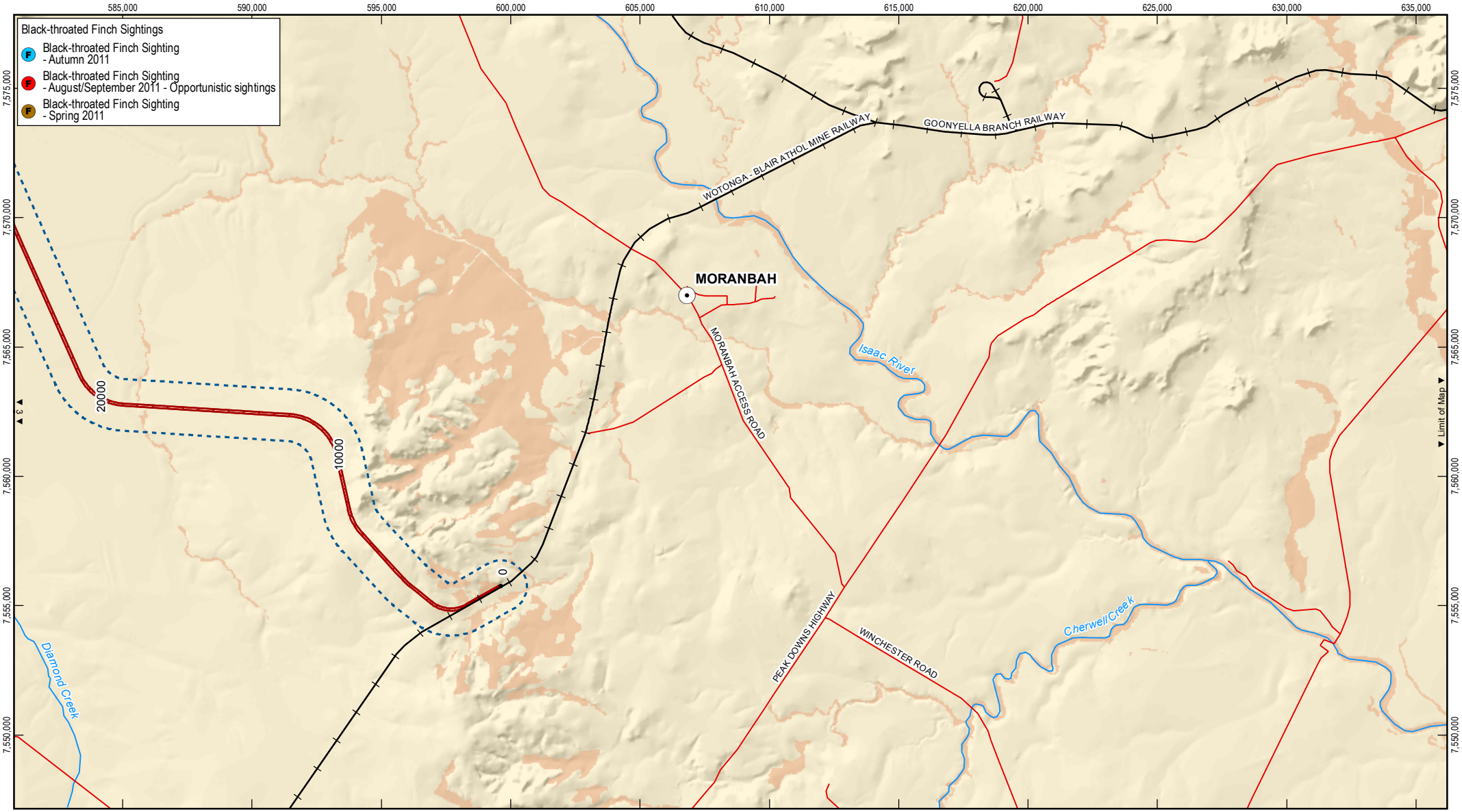
Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-13
Sheet 3 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_460_200k_rev_b.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Black-throated Finch Habitat, Sightings (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



1:200,000 (at A4)

0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Black-Throated Finch (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Black-throated Finch (southern) Habitat at the Rail Study Area and the Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-13
Sheet 4 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_460_200k_rev_b.mxd

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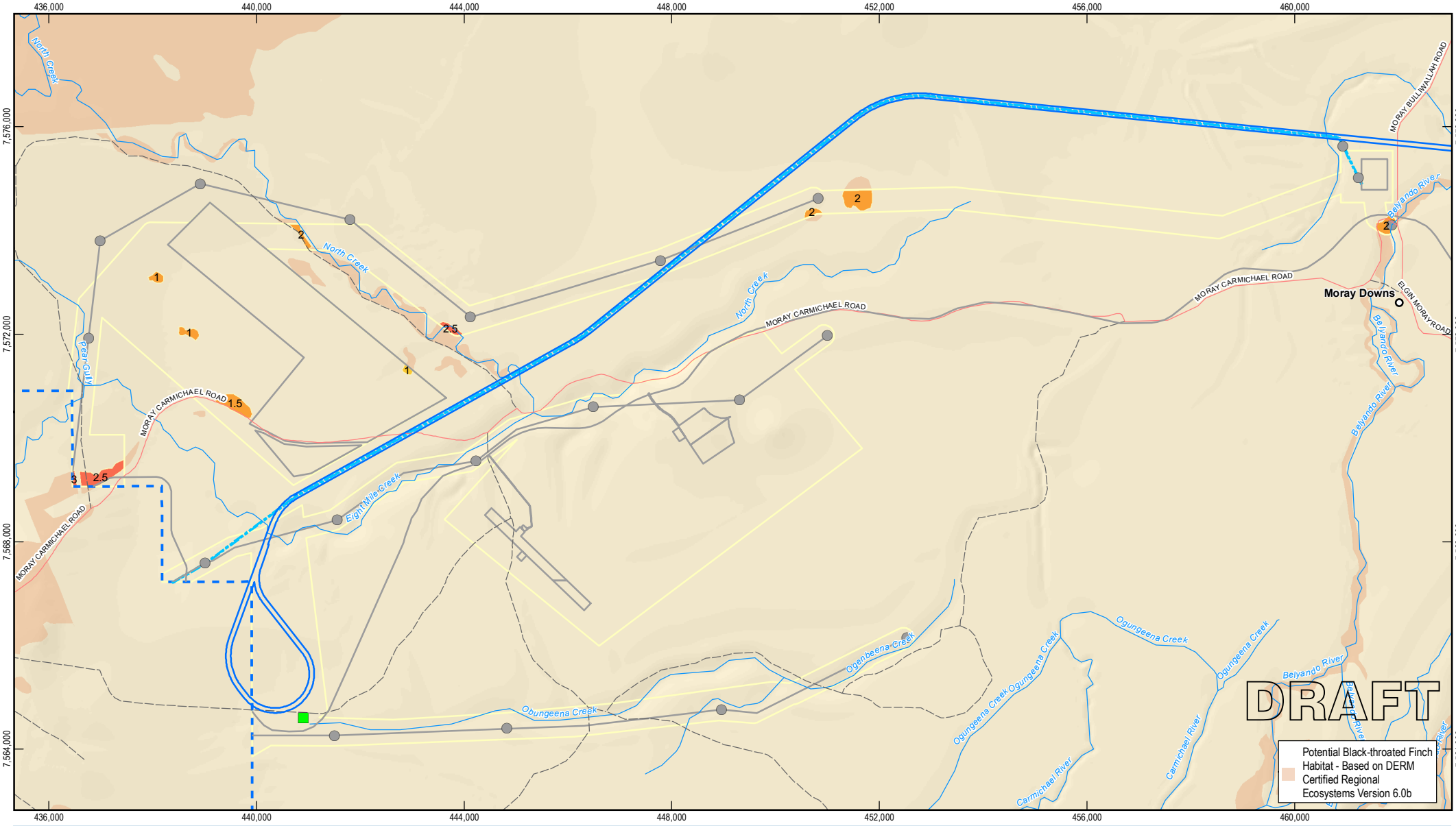
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Black-throated Finch Habitat, Sightings (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



1:100,000 (at A4)

0 2 4

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Homestead
- Confirmed Location of Black-throated Finch
- Local Road
- Track
- Watercourse
- Rail Corridor
- Water Supply Pipeline
- Study Area
- Project Area
- Mine (Offsite)
- Mine (Offsite)

Habitat Value: 1, 2, 3

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Environmental Assessment Report

Distribution of Potential Habitat for the Black-throated Finch within the Study Area

Figure 12

Job Number	41-26422
Revision	B
Date	27-06-2013

G:\41\26422\GIS\Maps\MXD\Environmental_Assessment_Report\41-26422_3010_rev_b.mxd

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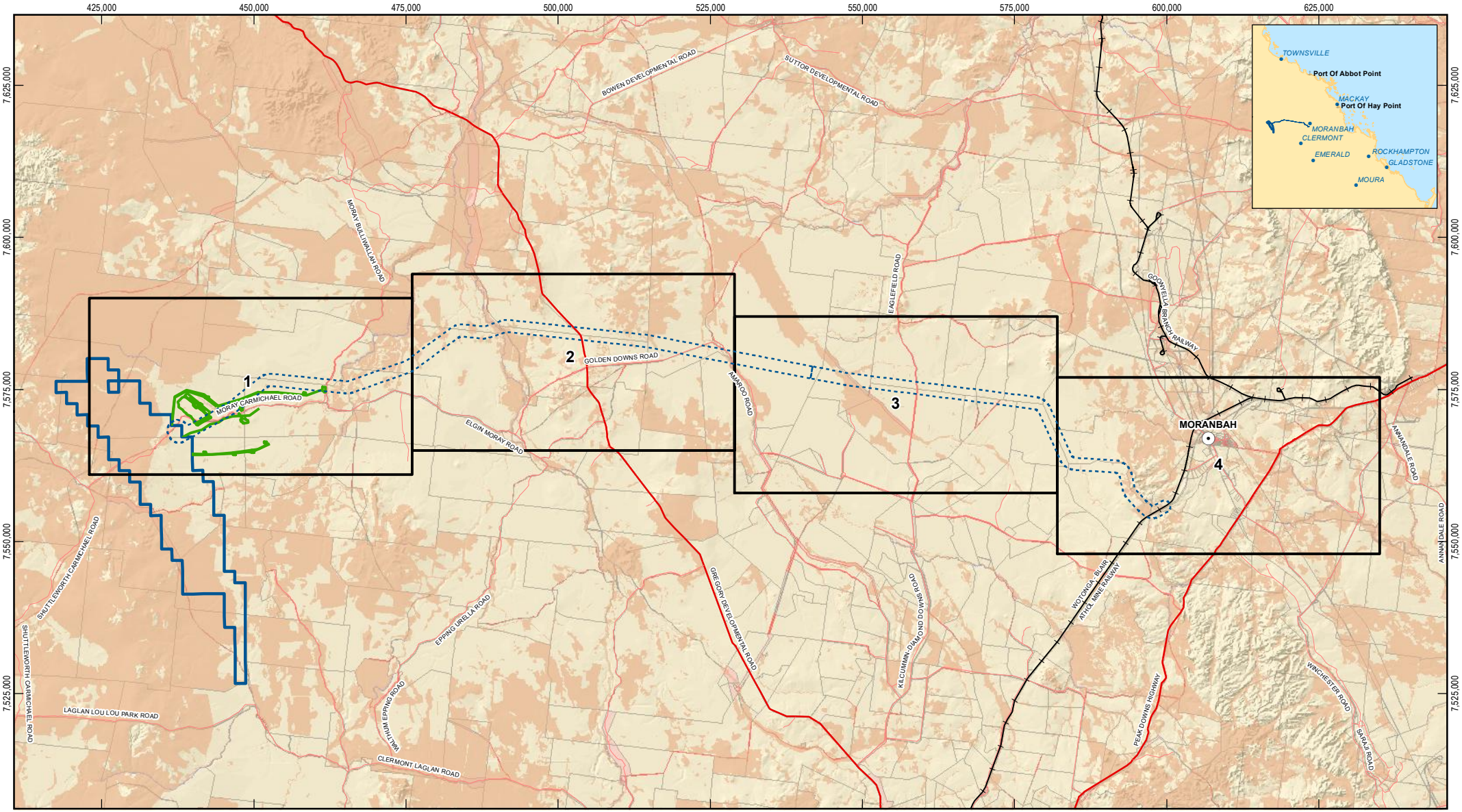
Data source: DME: EPC1690 (2010)/EPC1080 (2011); DNRM: Potential Habitat (2011); GHD: Confirmed Sightings (2013), Habitat Value (2013); © Commonwealth of Australia (Geoscience Australia): Watercourse, Tracks (2007); Adani: Alignment Opt11 Rev 2 (SP1 and 2)(2013), Offsite Infrastructure (2013); Gassman/Hyder: Mine (Offsite) Moray Carmichael Road Realignment (Opt 2) (2013). Created by: AJ. Created by: MS

C.4 Squatter Pigeon



1:850,000 (at A4)

0 5 10 15 20 25

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- State Road
- Local Road
- Other Railway
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Mine (Onsite)
- Mine (Offsite)
- Study Area
- Potential Squatter Pigeon (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Location of Squatter Pigeon Sightings and Potential Squatter Pigeon (southern) Habitat Within the Study Area and Surrounding Landscape

Job Number	41-25215
Revision	B
Date	11-09-2012

Figure 5-10
Series Index

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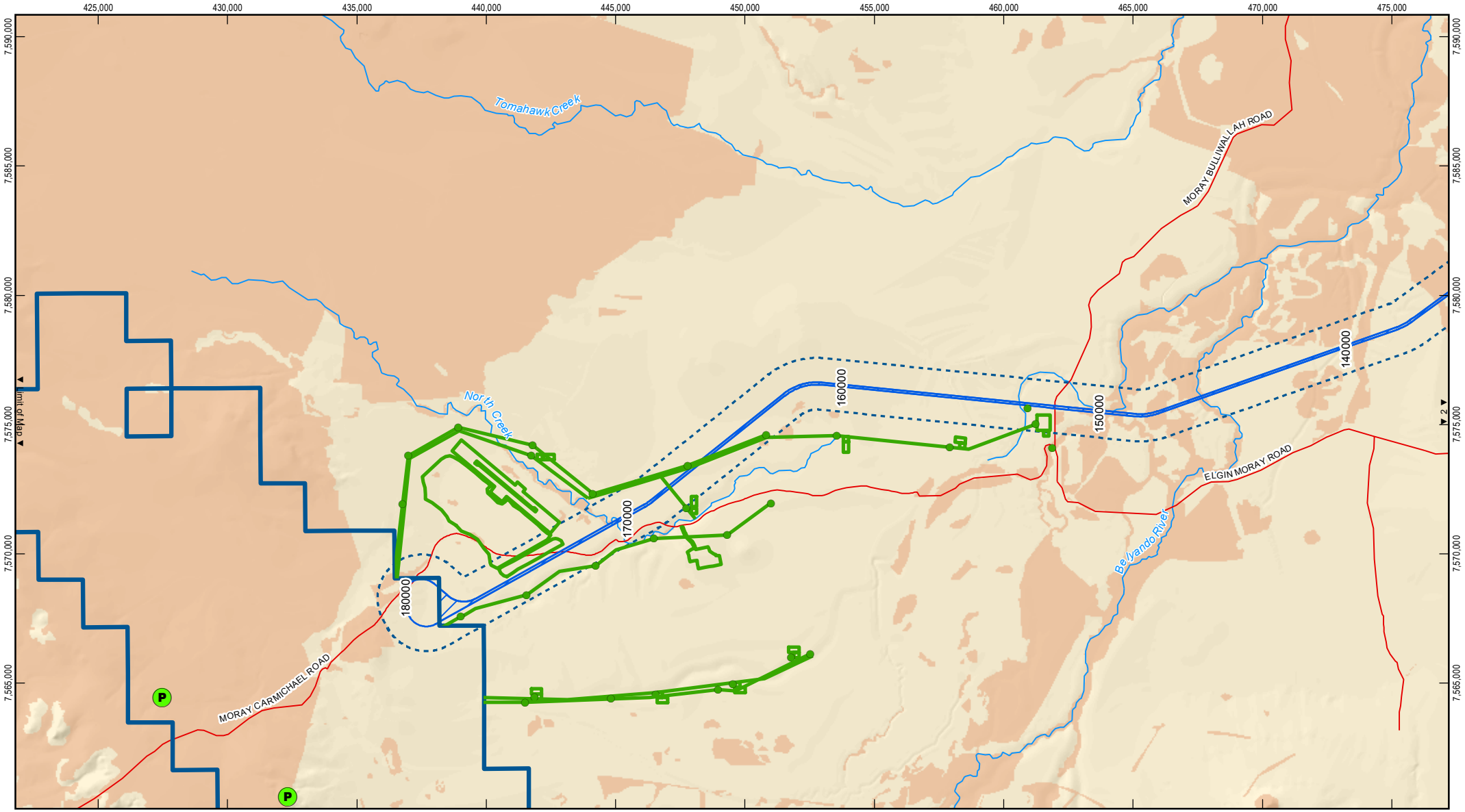


1:200,000 (at A4)
0 1 2 3 4 5
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Squatter Pigeon Sighting - Spring 2011
- Town
- Road
- Other Railway
- Watercourse
- Rail (West)
- Rail (East)
- Study Area
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Potential Squatter Pigeon (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Location of Squatter Pigeon Sightings and Potential Squatter Pigeon (southern) Habitat within the Study Area and Surrounding Landscape

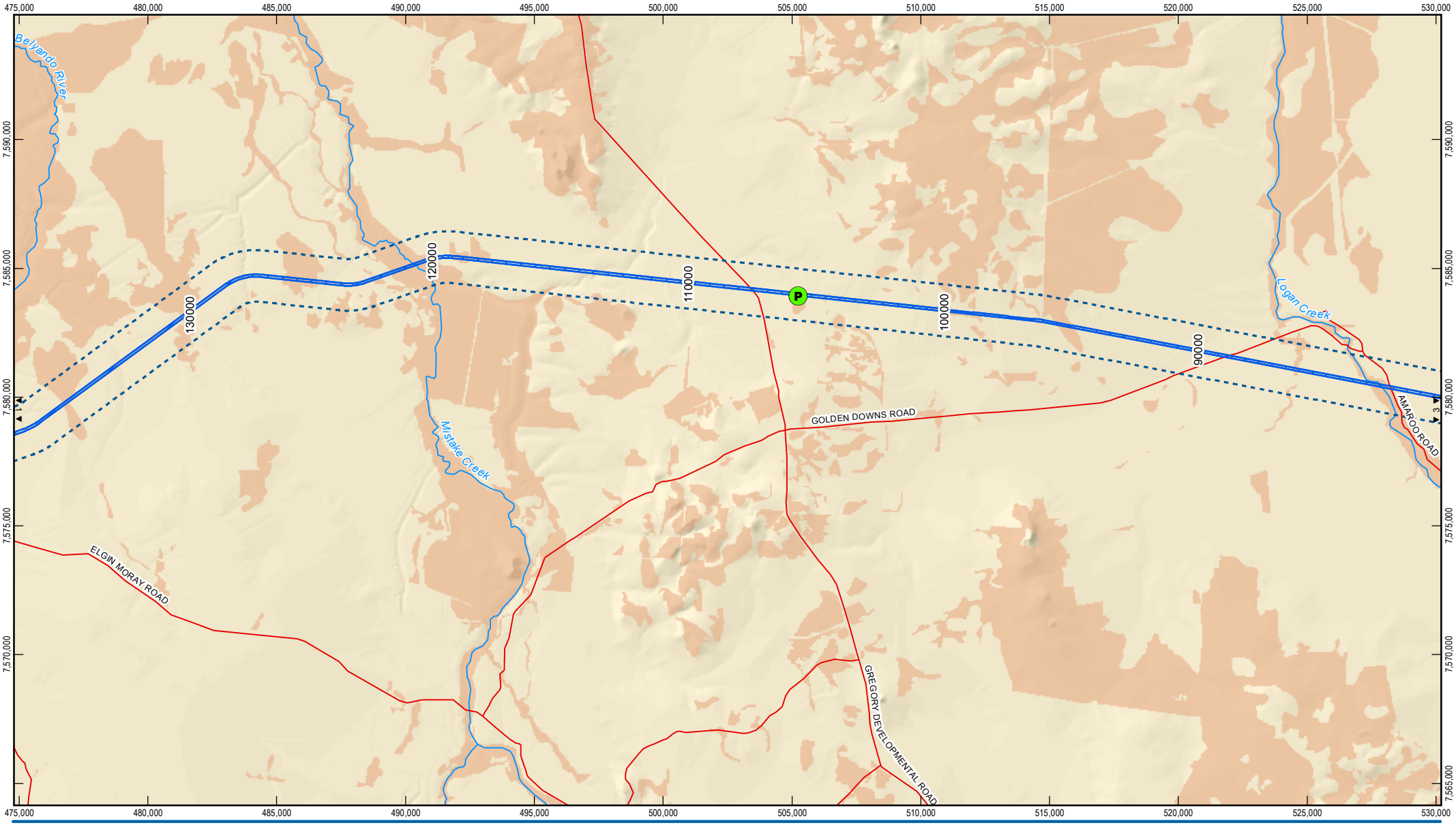
Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-10
Sheet 1 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_459_200k_rev_b.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); Potential Squatter Pigeon Habitat, Sightings (2012); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Squatter Pigeon Sighting - Spring 2011
- Town
- Road
- Other Railway
- Watercourse
- Rail (West)
- Rail (East)
- Study Area
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Potential Squatter Pigeon (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Location of Squatter Pigeon Sightings and Potential Squatter Pigeon (southern) Habitat within the Study Area and Surrounding Landscape

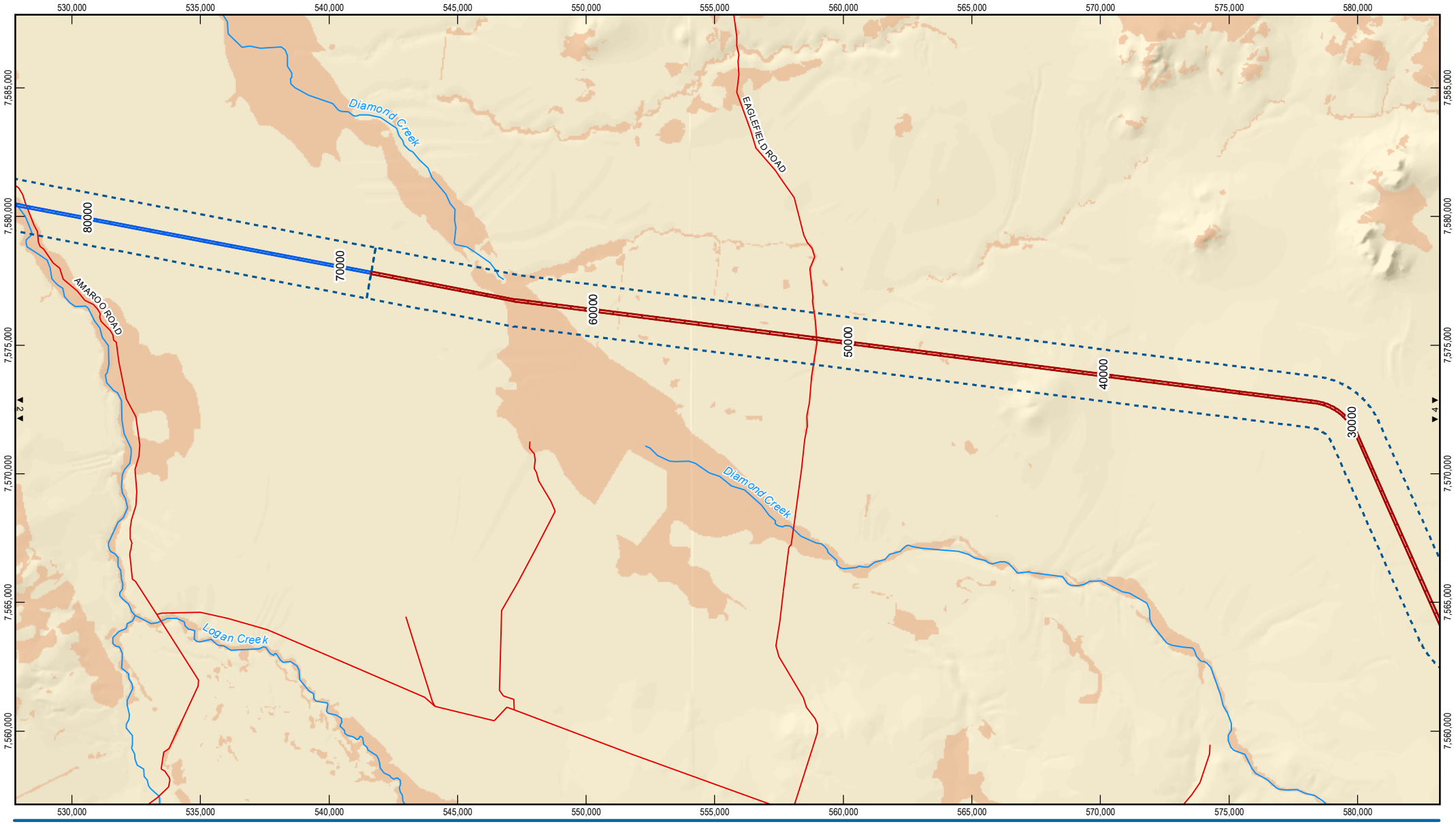
Job Number	41-25215
Revision	B
Date	11-09-2012

Figure 5-10
Sheet 2 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_459_200k_rev_b.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); Potential Squatter Pigeon Habitat, Sightings (2012); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Squatter Pigeon Sighting - Spring 2011
- Town
- Road
- Other Railway
- Watercourse
- Rail (West)
- Rail (East)
- Study Area
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Potential Squatter Pigeon (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

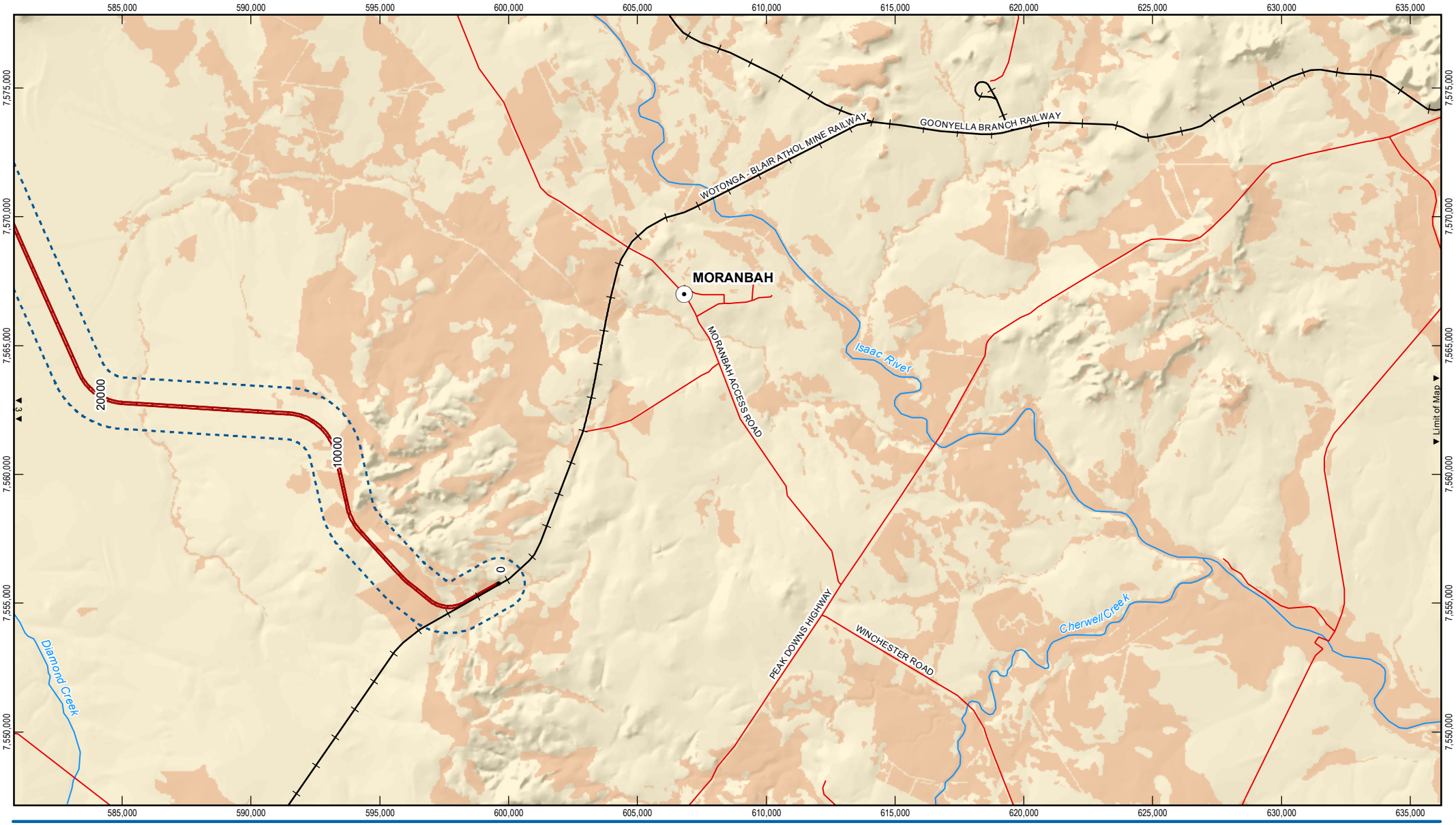
Location of Squatter Pigeon Sightings and Potential Squatter Pigeon (southern) Habitat within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-10
Sheet 3 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_459_200k_rev_b.mxd Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); Potential Squatter Pigeon Habitat, Sightings (2012); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Squatter Pigeon Sighting - Spring 2011
- Town
- Road
- Other Railway
- Watercourse
- Rail (West)
- Rail (East)
- Study Area
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Potential Squatter Pigeon (Southern) Habitat - Based on DERM Certified Regional Ecosystems Version 6.0b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Location of Squatter Pigeon Sightings and Potential Squatter Pigeon (southern) Habitat within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision B
Date 11-09-2012

Figure 5-10
Sheet 4 of 4

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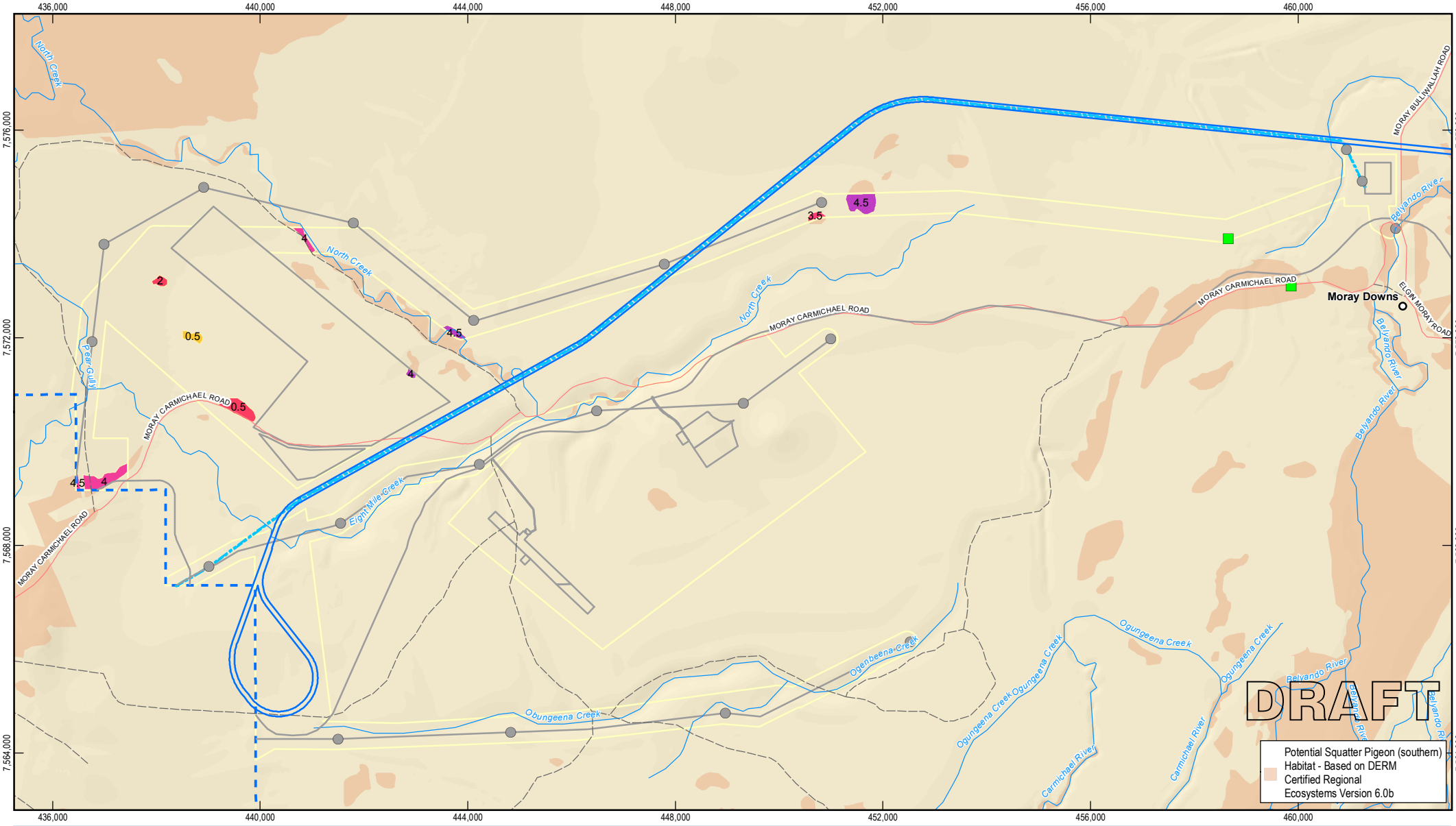
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); Potential Squatter Pigeon Habitat, Sightings (2012); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 2 4

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Homestead
- Confirmed Location of Squatter Pigeon (southern)
- Local Road
- Track
- Watercourse
- Rail Corridor
- Water Supply Pipeline
- Study Area
- Project Area
- Mine (Offsite)
- Mine (Offsite)
- Habitat Value: 1, 4, 5, 6, 7

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Environmental Assessment Report

Distribution of Potential Habitat for the Squatter Pigeon (southern) within the Study Area

Figure 13

Job Number	41-26422
Revision	A
Date	27-06-2013

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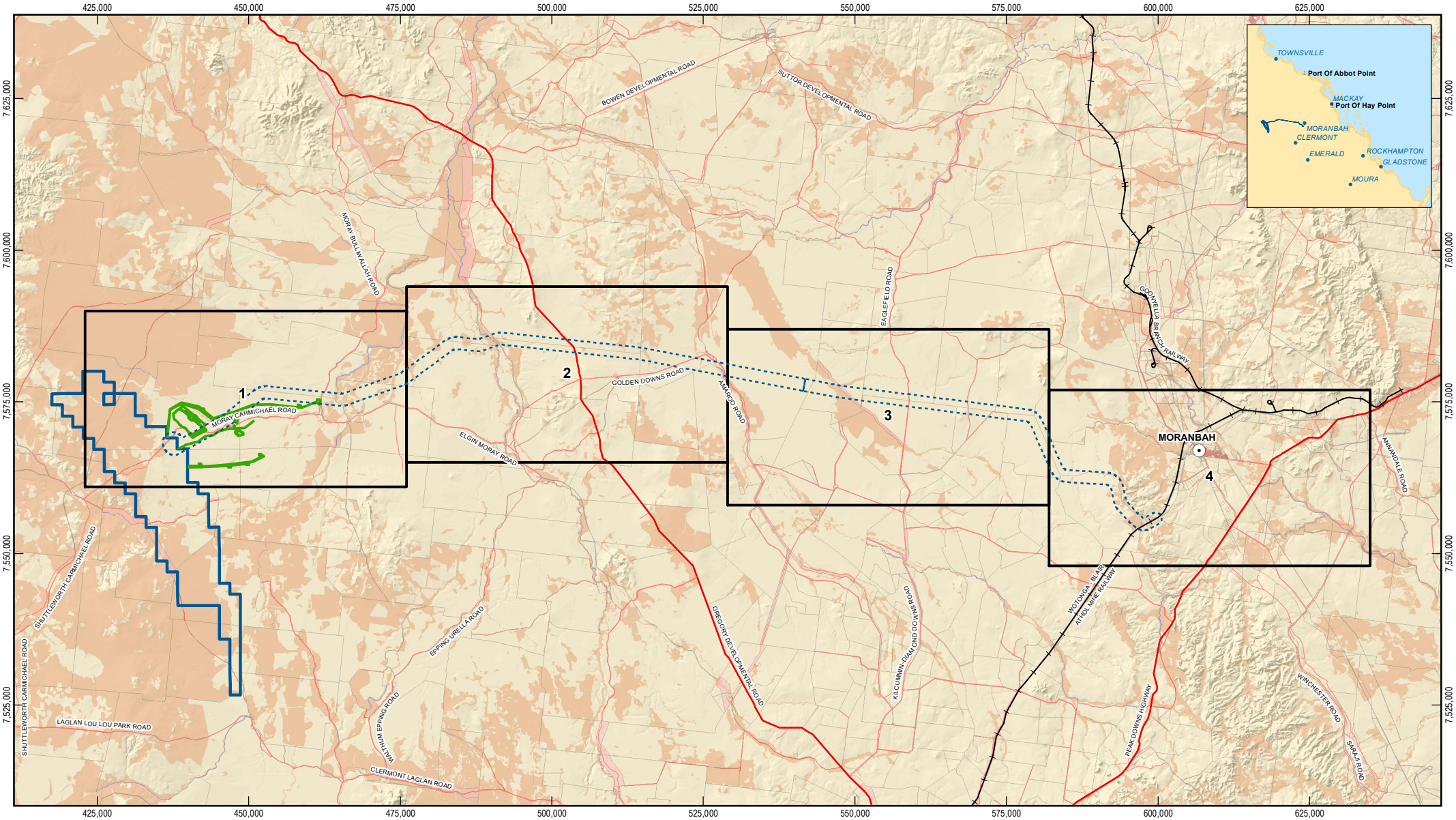
Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DME: EPC1690 (2010)/EPC1080 (2011); DNRM: Potential Habitat (2011); GHD: Confirmed Sightings (2013), Habitat Value (2013); © Commonwealth of Australia (Geoscience Australia): Watercourse, Tracks (2007); Adani: Alignment Opt11 Rev 2 (SP1 and 2)(2013), Offsite Infrastructure (2013); Gassman/Hyder: Mine (Offsite) Moray Carmichael Road Realignment (Opt 2) (2013). Created by: AJ. Created by: MS

C.5 Koala



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0 5 10 15 20 25

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- State Road
- Local Road
- Other Railway
- Cadastral Parcel
- Road Reserve
- Watercourse Reserve
- Mine (Onsite)
- Mine (Offsite)
- Study Area
- Potential Koala Habitat - Based on DERM Certified Regional Ecosystems Version 6.1b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Koala Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision A
Date 18-09-2012

Figure 5-12
Series Index

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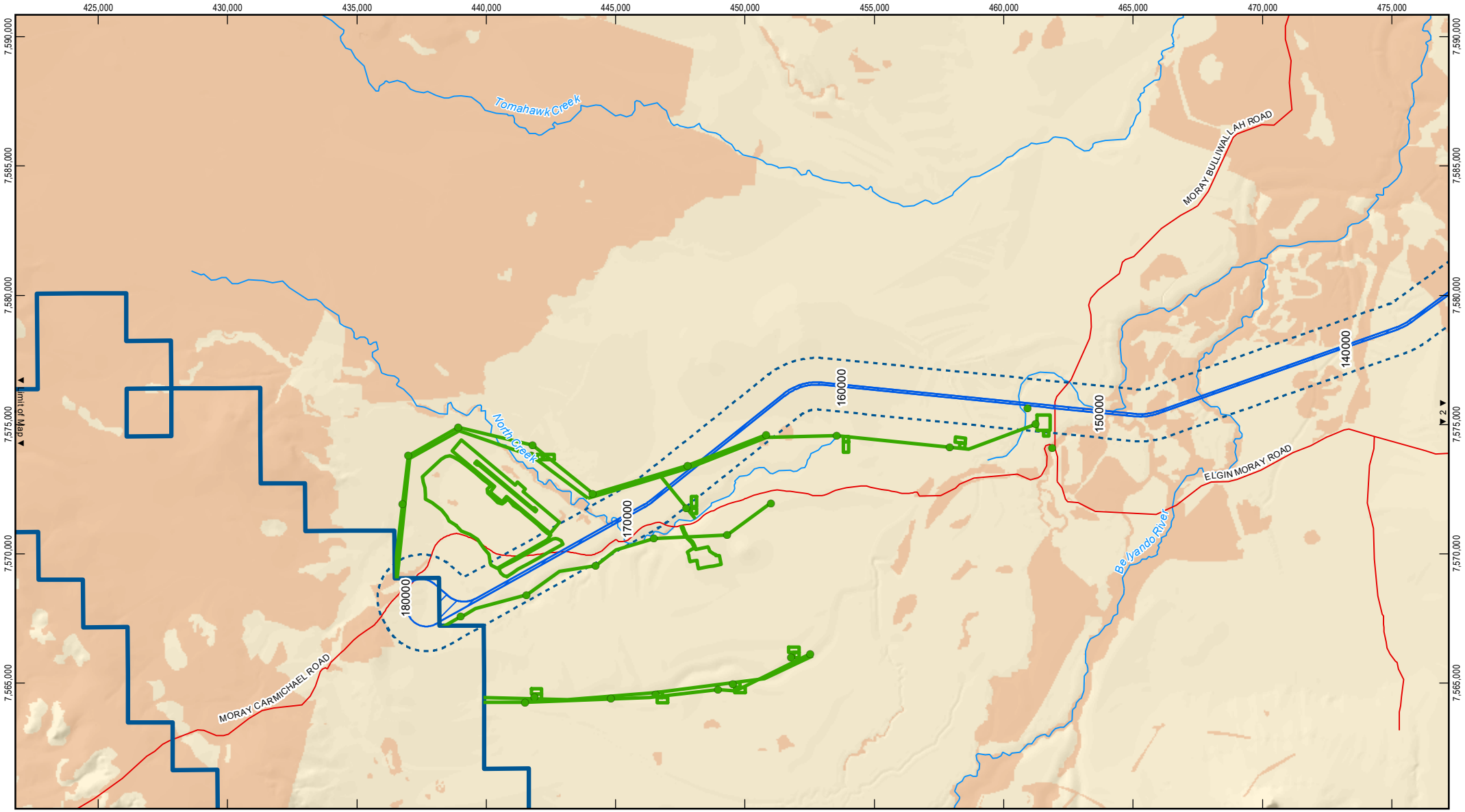
Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), DCDB (2010); DME: EPC1690 (2010)/EPC1080 (2011); © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads (2007); Adani: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012); GHD: Potential Habitat (2012). Created by: BW, CA



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0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Koala Habitat - Based on DERM Certified Regional Ecosystems Version 6.1b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Koala Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision A
Date 18-09-2012

Figure 5-12
Sheet 1 of 4

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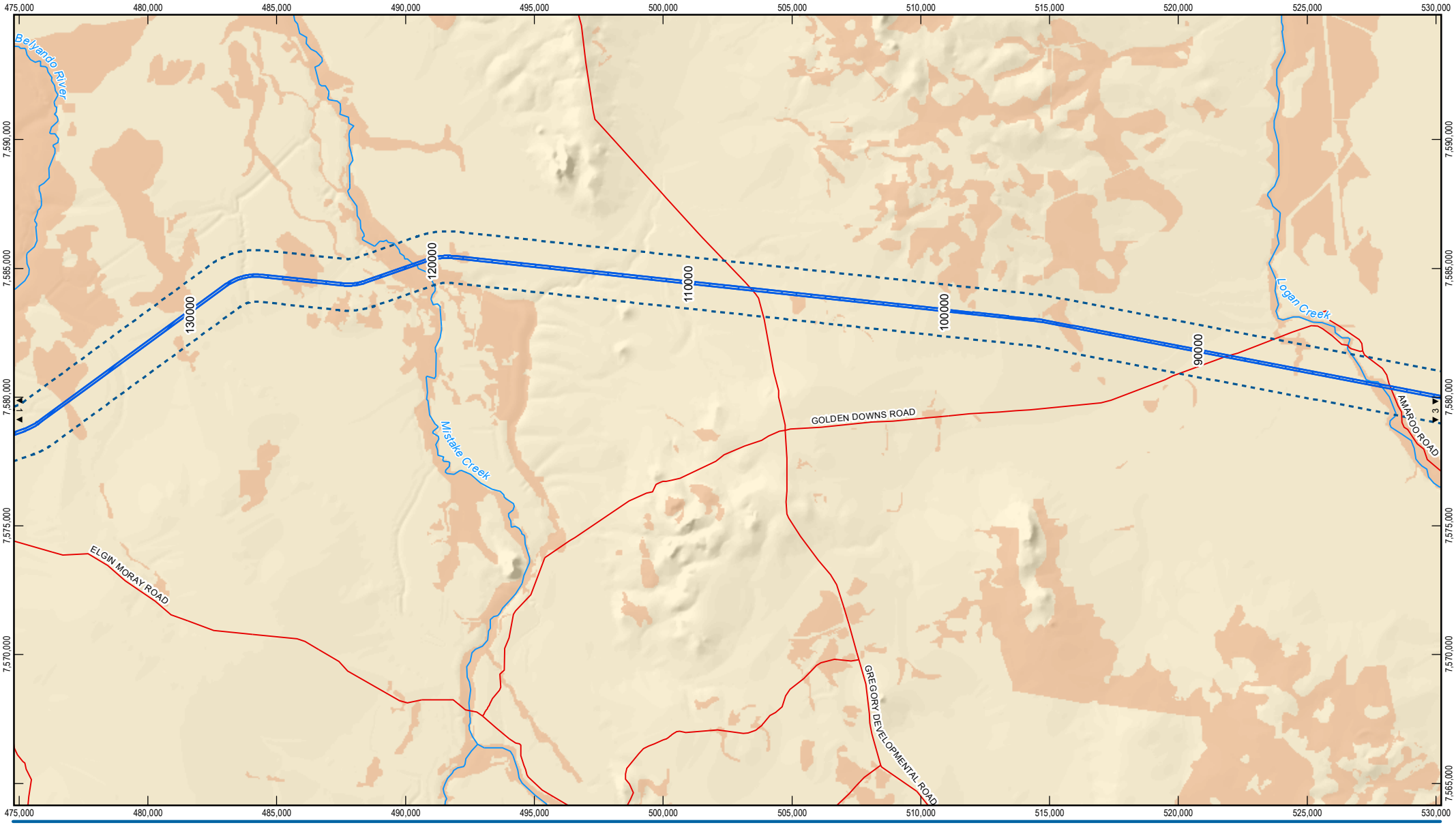
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Koala Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Koala Habitat - Based on DERM Certified Regional Ecosystems Version 6.1b

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Potential Koala Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision A
Date 18-09-2012

Figure 5-12
Sheet 2 of 4

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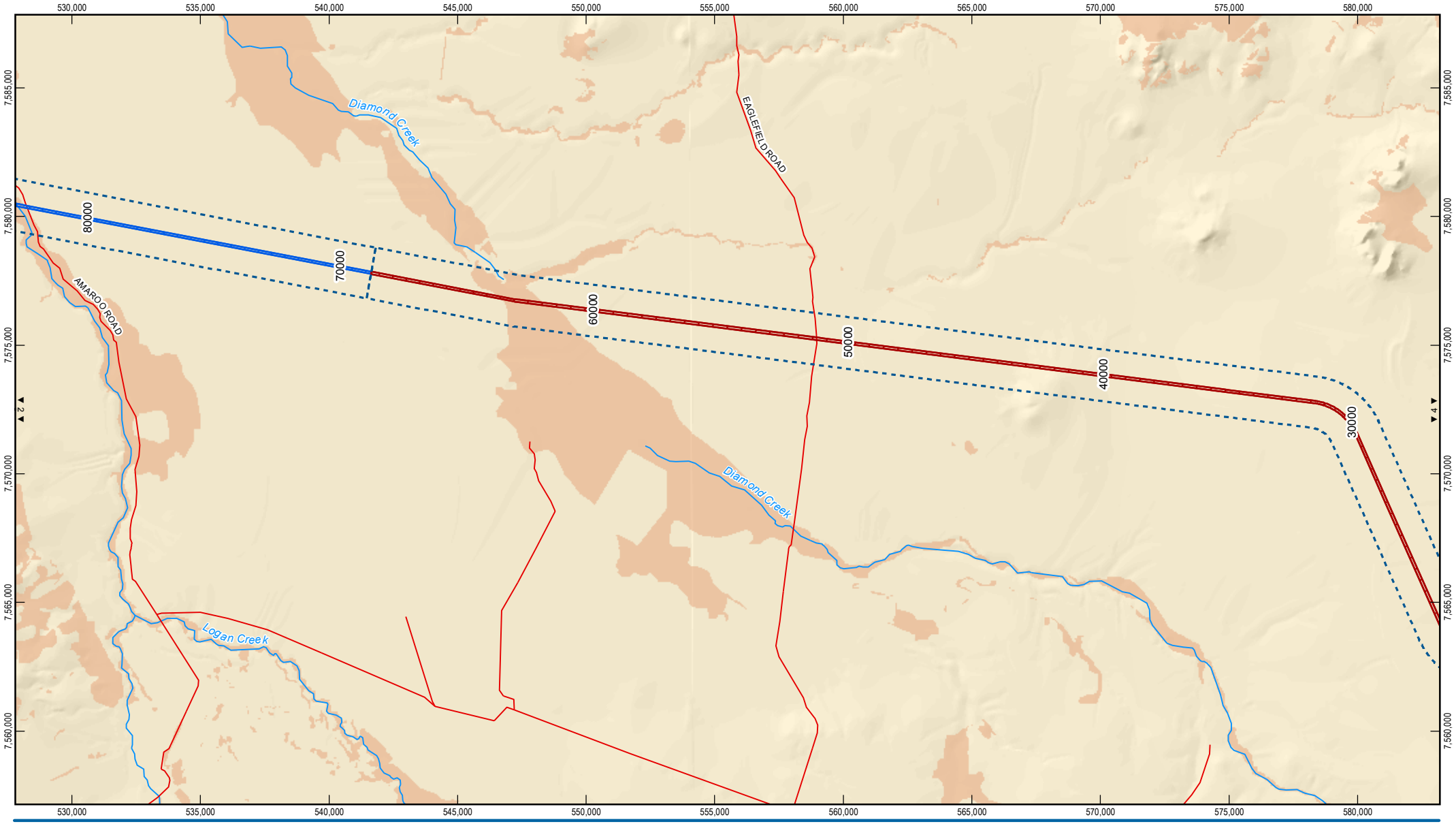
Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Koala Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Koala Habitat - Based on DERM Certified Regional Ecosystems Version 6.1b

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

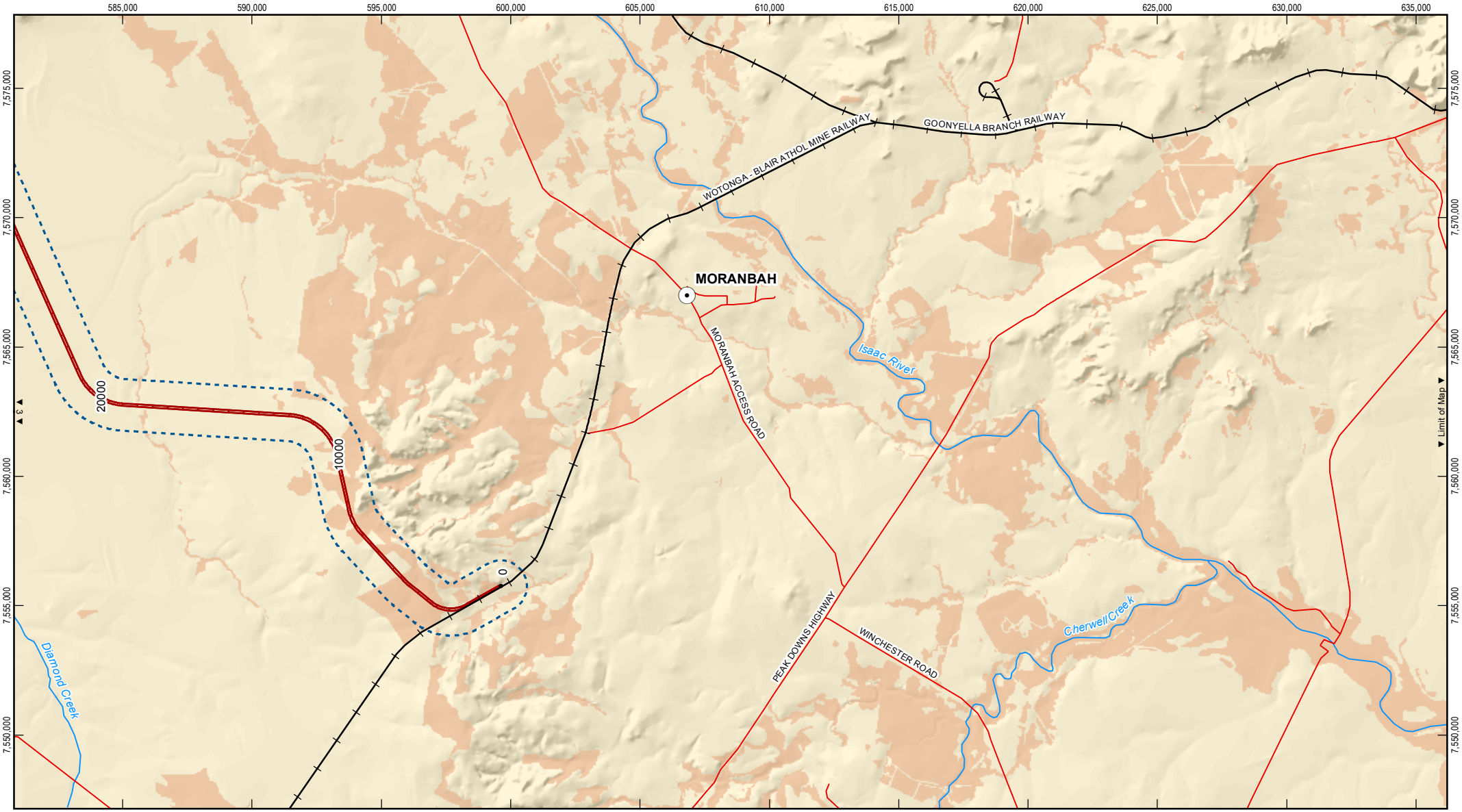
Potential Koala Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision A
Date 18-09-2012

Figure 5-12
Sheet 3 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_4050_200k_rev_a.mxd Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Koala Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 1 2 3 4 5
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Town
- Road
- Other Railway
- Watercourse
- Mine (Onsite)
- Mine (Offsite)
- Mine (Offsite)
- Rail (West)
- Rail (East)
- Study Area
- Potential Koala Habitat - Based on DERM Certified Regional Ecosystems Version 6.1b

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

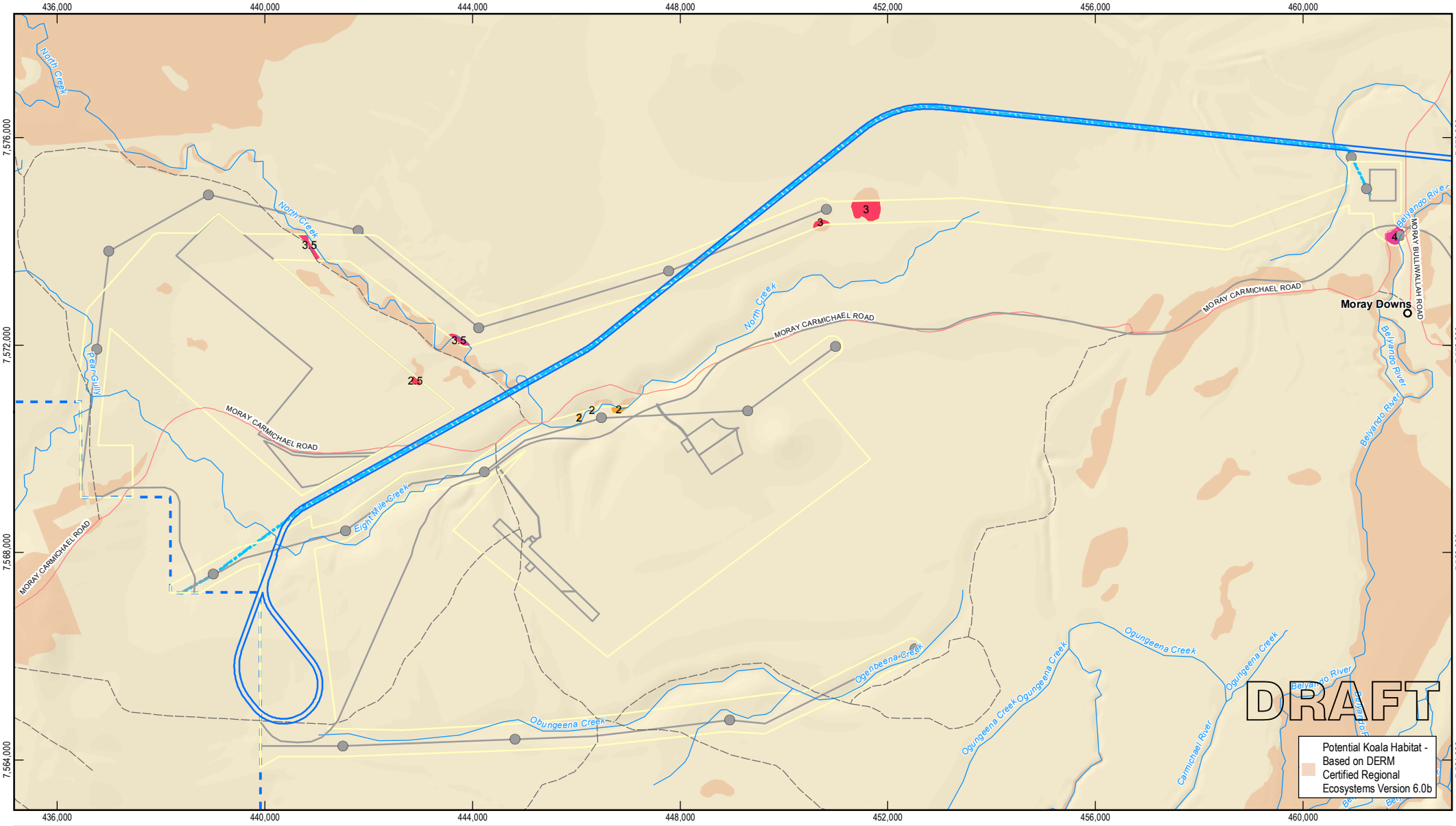
Potential Koala Habitat Within the Study Area and Surrounding Landscape

Job Number 41-25215
Revision A
Date 18-09-2012

Figure 5-12
Sheet 4 of 4

G:\41\25215\GIS\Maps\MXD\400_Ecology\41-25215_4050_200k_rev_a.mxd Level 4, 201 Charlotte St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: DERM: DEM (2008), © Commonwealth of Australia (Geoscience Australia): Localities, Railways, Roads, Watercourse (2007); GHD: Potential Koala Habitat (2011); Adani: Alignment Opt9 Rev3 (2012); DME: EPC1690 (2010) / EPC1080 (2011); Gassman/Hyder: Mine (Offsite) (2012). Created by: MR, CA



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0 2 4

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Homestead
- Local Road
- Track
- Watercourse
- Rail Corridor
- Water Supply Pipeline
- Study Area
- Project Area
- Mine (Offsite)
- Mine (Offsite)
- Habitat Value
  - 2
  - 4
  - 5
  - 6

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS
Environmental Assessment Report

Distribution of Potential Habitat for the Koala within the Study Area

Job Number	41-26422
Revision	A
Date	27-06-2013

Figure 14

G:\41\26422\GIS\Maps\MXD\Environmental_Assessment_Report\41-26422_3012_rev_a.mxd

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Data source: DME: EPC1690 (2010)/EPC1080 (2011); DNRM: Potential Habitat (2011); Habitat Value (2013); © Commonwealth of Australia (Geoscience Australia): Watercourse, Tracks (2007); Adani: Alignment Opt11 Rev 2 (SP1 and 2)(2013), Offsite Infrastructure (2013); Gassman/Hyder: Mine (Offsite) Moray Carmichael Road Realignment (Opt 2) (2013). Created by: AJ. Created by: MS

146°40'0"E
146°50'0"E
147°0'0"E
21°50'0"S
22°0'0"S
TOMAHAWK CREEK
Moray Bullivallah Road
BELYANDO RIVER
North Creek
Moray Pit
Elgin Moray Road
Moray Carmichael Boundary Road
OG UNGEENA CREEK
CARMICHAEL RIVER
GOWRIE CREEK
Disney
Borrow 7
Gregory Developmental Road
MISTAKE CREEK
Borrow 8
Elgin Pits
FOX CREEK
Back Creek

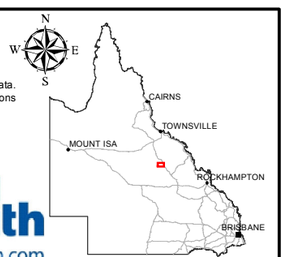
Adani Quarry Permits and Approvals
Figure 5-1 Conservation significant species locations

Legend

- Minor Road
- Major Road
- Major watercourse
- Minor watercourse
- Wetland
- Quarry Extraction Area
- Quarry Investigation Site
- Squatter Pigeon
- Potential Koala Scratches
- Ornamental Snake
- Cotton Pygmy-Goose and Glossy Ibis
- Rainbow Bee-eater
- Eastern Great Egret
- White-throated Needletail

0 1,250 2,500 5,000
Metres

Data source:
Survey by CDM Smith, 2012; Adani, 2012; DERM, 2010;
Base Layer by Bingmaps, 2011.



CDM Smith
cdmsmith.com

Appendix D. DEHP Fauna Register

Department of Environment and Heritage Protection

Wildlife data records

Wildlife management

Nature Conservation Act 1992

Nature Conservation (Administration) Regulation 2006

Nature Conservation (Wildlife Management) Regulation 2006

Spotter catcher records: when dealing with an animal of a species whose habitat has been destroyed by natural disaster or is about to be destroyed by human activity

Action codes legend:

R1 = release, no further action (mark column with X)
R2 = release with first aid (mark column with V or C (V = Vet / C = Carer)
D = death (mark column with X)

Wildlife data records

Spotter catcher wildlife data records

Permit holder's name:*	
Permit number:*	**WI**
Date permit issued:	
Expiry date of the permit:	
Name of person in charge *(if applicable):*	

Permit holder's address:

Permit holder's contact number/s:

* Mandatory information fields

For period:

		Capture location					Release details				Actions				
*Collector's name/s * *	*Start date * *	*Latitude * *	*Longitude * *	*Count type**	*Status**	*Scientific name / common name * *	*Count**	*Date**	*Latitude * *	*Longitude * *	*R1*	*R2*	*D*	*Location description**	*Comments*

Note: To insert extra lines in Windows 7 select 'Home' tab then click the 'Cells' tab and select 'insert sheet rows' otherwise go to the ' Insert' menu and click 'Rows'.

Return in electronic format to:

The Wildlife Ranger in the regional office that issued your permit.

Appendix E. DEHP Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland

Department of Environment and Heritage Protection

Code of Practice

Care of Sick, Injured or Orphaned Protected Animals in Queensland

Nature Conservation Act 1992

Great state. Great opportunity.

Queensland Government

Prepared by: Nature Conservation Services Branch, Department of Environment and Heritage Protection

Approved in accordance with section 174A of the *Nature Conservation Act 1992*

Acknowledgements

This code of practice has been prepared by the Department of Environment and Heritage Protection in consultation with the Queensland Wildlife Rehabilitation Council, RSPCA Queensland and the Department of Agriculture, Fisheries and Forestry.

March 2013

Table of contents

1. Purpose of this code

1 This code of practice (the code) has been prepared by the Department of Environment and Heritage Protection (EHP) in consultation with the Department of Agriculture, Fisheries and Forestry (DAFF), RSPCA Queensland (RSPCA Qld), the Queensland Wildlife Rehabilitation Council (QWRC) and the wildlife care community. This code will ensure that the activities of all parties involved in the care and rehabilitation of native animals in Queensland result in the best possible conservation and animal welfare outcomes for rehabilitated animals and the wild populations they are returned to.

This code is made under the *Nature Conservation Act 1992* (the Act), and in consideration of the Nature Conservation (Wildlife Management) Regulation 2006 (the Wildlife Management Regulation), Nature Conservation (Administration) Regulation 2006 (the Administration Regulation), Nature Conservation (Wildlife) Regulation 2006 (the Wildlife Regulation), *Animal Care and Protection Act 2001, Veterinary Surgeons Act 1936* and *Workplace Health and Safety Act 1995.*

1.1 The purpose of this code is to provide information, recommendations, minimum standards and guidelines to ensure that all parties involved in the care and rehabilitation of protected animals in Queensland do so in an appropriate manner.

1.2 The code emphasises the responsibility of all persons and organisations involved in the care, rehabilitation and release of sick, injured or orphaned protected animals to ensure that:

1.2.1 animal welfare meets acceptable standards

1.2.2 conservation benefits are maximised

1.2.3 adverse ecological outcomes are avoided

1.2.4 risks to human health and safety are minimised.

1.3 The code gives due regard to the many factors that determine what is appropriate in the circumstances, including:

1.3.1 current community values and expectations regarding the management and rehabilitation of sick, injured or orphaned animals

1.3.2 the values and opinions of wildlife rehabilitators and others with expertise

1.3.3 the importance of minimising the suffering of sick, injured or orphaned animals, and in particular the role of timely euthanasia in appropriate cases

1.3.4 the responsibility of EHP to protect and conserve the environment, ecosystems and wildlife

1.3.5 the risks to human health and safety associated with the rescue, care and rehabilitation of protected animals in Queensland

1.3.6 the relevant legislation as stated in section 1 under ‘Purpose of this code’

1.3.7 the availability of resources, such as access to veterinary facilities or expertise.

1.4 There are other Acts and legislative instruments that may make provisions about, or affect certain aspects of wildlife care and rehabilitation, such as local laws regarding the keeping of animals, or laws about trespassing on private property. It is **not** the intent of this code to deal with all of these provisions.

2. General information

2.1 All native birds, mammals (except the dingo outside protected areas), reptiles and amphibians and, some native fish and invertebrates in Queensland are protected under the *Nature Conservation Act 1992*.

2.2 EHP is the agency responsible for the assessment and licensing of individuals and organisations for the purposes of wildlife rehabilitation. Licensed individuals or entities are referred to herein as 'permit holders'.

2.3 DAFF is the agency responsible for administering the *Animal Care and Protection Act 2001*.

2.4 QWRC is the peak representative body for the wildlife rehabilitation community in Queensland. The council's focus is to ensure excellent welfare for native animals during and after rehabilitation to achieve, complement and advance conservation benefits and outcomes.

2.5 This code applies to all individuals, organisations and members of organisations operating under a rehabilitation permit.

2.6 A person who rescues a protected animal, but is not a licensed rehabilitator, must surrender it to a licensed rehabilitator or conservation officer within 72 hours of taking the animal into care as stated in section 59 (4) of the Nature Conservation (Wildlife Management) Regulation 2006.

2.7 A person or organisation engaging in wildlife rehabilitation must be licensed. It is the responsibility of the permit holder to ensure compliance with the provisions of this code.

2.7.1 EHP is responsible for administration of this code.

2.7.2 this code does **not** exempt a person or other entity from compliance with any Act, regulation or other statutory instrument.

2.7.3 this code is current at the time of publication and may be subject to periodic review.

2.7.4 a wildlife rehabilitator may only rehabilitate an animal of a species for which they hold a relevant permit. If the rehabilitator is a member of a rehabilitation organisation, they will require the approval of the organisation to rehabilitate that particular species.

2.7.5 EHP may approve the development and distribution of species-specific standards for native wildlife rehabilitation. Meeting any such standards that may be in place is a requirement in order to comply with the code.

2.7.6 to ensure compliance with local government laws, rehabilitators may also require local government approval to conduct the activity at the specified location.

2.8 This code (sections 1–18) will have immediate effect from the date of gazettal. Appendix A (Minimum enclosure size) will have immediate effect from the date of gazettal of the code for any new enclosures being built or purchased. Existing enclosure facilities must be upgraded to meet the minimum enclosure size requirements within 24 months of the gazettal date of the code.

Note: All persons intending to become licensed, or become a member of an organisation that is licensed, to care for sick, injured or orphaned protected animals should become familiar with the *Animal Care and Protection Act 2001*.

3. Principles underpinning this code

3.1 The fundamental principles underpinning this code that should guide wildlife rehabilitators at all times in the conduct of their activities are:

3.1.1 **Duty of care:** under section 17 of the *Animal Care and Protection Act 2001*, a person in charge of an animal during its rescue, care, rehabilitation or release has a statutory duty of care to appropriately provide for the animal's welfare.

3.1.2 **Avoid harm:** in rescuing, caring for, and returning native animals to the wild, there is a risk of adverse animal welfare and ecological outcomes. Even well intentioned care or treatments may prolong or worsen an animal's suffering, and inappropriate release of animals may have significant detrimental effects on local ecosystems and wildlife communities. At all stages of the rehabilitation process the potential for adverse animal welfare and ecological outcomes must be considered and avoided.

3.1.3 **Avoid risks to human health and safety:** in rescuing, caring for, and returning native animals to the wild, there are generic, situation-specific and species-specific risks to persons involved that must be considered and minimised.

Note: Anyone involved in the rescue, care and handling of wildlife should contact their general practitioner or local immunisation provider for more information on appropriate disease prevention measures including any recommended or required vaccinations.

3.1.4 **Relieve suffering:** a main objective of wildlife rescue and rehabilitation is to relieve suffering in sick, injured or orphaned wildlife; it is **not** to protect and preserve life at all costs. In this way, the objectives of wildlife rehabilitation are fundamentally different from those of human medicine. The rehabilitation and release of wildlife to the wild is the primary objective, but it must **not** be pursued to preserve the life of an animal at all costs or to achieve broader conservation outcomes where the animal is subject to unjustifiable and unreasonable suffering.

3.1.5 **Fair, reasonable and appropriate measures:** in deciding what is fair, reasonable and appropriate, regard must be had to:

- the environment and circumstances of the animal
- the steps a reasonable person would reasonably be expected to have taken under the circumstances.

3.2 These fundamental and guiding principles should be applied to all aspects of the rescue, care, rehabilitation and release of rescued animals, and appropriate application of these principles will assist wildlife rehabilitators and organisations in complying with the code.

4. General provisions for the care of **sick, injured or orphaned** protected animals

4.1 The broad objectives of the rescue and rehabilitation of sick, injured or orphaned protected animals are to:

4.1.1 relieve suffering in sick, injured or orphaned protected animals by providing appropriate husbandry and care, pain relief, veterinary treatment when required, and timely euthanasia in cases with a poor prognosis

4.1.2 contribute to the conservation of nature by promptly returning suitably rehabilitated animals to their native habitats.

4.2 Additional outcomes of the rescue and rehabilitation of sick, injured or orphaned protected animals include:

4.2.1 contribution to the body of knowledge on the ecology, conservation, management, veterinary care, husbandry and behaviour of native animal species

4.2.2 contribution to the education of the general public, business and industry professions on issues related to the conservation and welfare of native animals.

4.3 Meeting the 'capacity to care' concept:

4.3.1 The concept of 'capacity to care' relates to the capacity of a rehabilitator or rehabilitation organisation to provide for the essential needs of rescued animals as well as have the resources necessary to appropriately prepare wildlife for release back into the wild.

4.3.2 When a person's or organisation's capacity to care is exceeded, unacceptable standards of animal care or welfare may result. This is likely to occur when the need for rescue and rehabilitation services exceeds the ability of rehabilitators and organisations to provide appropriate care. This is particularly so when major environmental or other events result in significantly increased wildlife casualties.

4.3.3 Rehabilitators and rehabilitation organisations should be mindful of their respective capacities to care, particularly when there is an influx of wildlife requiring care due to major incidents like bushfire, significant weather events and other natural disasters.

4.3.4 When the capacity to care is exceeded and animal welfare standards are likely to be compromised, there are three acceptable management options, which are, in order of preference:

4.3.4.1 referral of animals to another licensed individual or organisation with a current capacity to care for that species

4.3.4.2 increase the capacity to care by increasing or pooling resources

4.3.4.3 lower the euthanasia threshold in combination with early triage of newly rescued wildlife and proper veterinary assessment and prognosis of animals in care.

4.3.5 Wildlife rescue and rehabilitation organisations should develop protocols and procedures that clearly define appropriate actions and responses in the event of catastrophic events or other circumstances in which the defined capacity to care may be exceeded.

For example: Policies and procedures relating to the establishment of good communication, collaboration and pooling of resources between organisations during major wildlife events.

4.3.6 The lowering of animal welfare standards such that they are **not** consistent with this code is **not** an acceptable response to exceeding the capacity to care.

4.3.7 In circumstances that involve major or catastrophic events and where the capacity to care is exceeded, lowering the threshold for euthanasia is a more appropriate response than **not** rescuing animals in distress.

5. Restrictions on caring for specialist protected animals

5.1 The species listed below may have requirements outside the normal capacity of most rehabilitators. Additional requirements are placed upon rehabilitators who intend to keep these species to improve the likelihood of their successful rehabilitation and return to the wild.

5.2 Permits may only be granted to persons assessed as having the appropriate skills and facilities to house and care for the following wildlife:

5.2.1 Cassowary:

contact EHP.

5.2.2 Echidna:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of this species.

5.2.3 Emu:

contact EHP. This species may only be rehabilitated on rural-residential and rural land.

5.2.4 Koala:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of this species.

5.2.5 Raptors:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of the relevant species. Only carers who are affiliated with a Raptor Association or those with a proven record and suitable facilities in raptor rehabilitation may keep raptors.

5.2.6 Reptiles:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of the relevant species.

5.2.7 Marine turtles:

contact EHP.

5.2.8 Platypus:

contact EHP.

5.2.9 Flying-foxes and insectivorous bats:

all persons caring for flying-foxes and insectivorous bats must be vaccinated against Australian Bat Lyssavirus (ABL) and must regularly consult their General Practitioner or Public Health Unit to maintain up-to-date vaccinations.

Note: In certain, prescribed circumstances, the use of lethal measures (shooting) is permitted for controlling flying-foxes damaging crops, in accordance with the 'Code of Practice – Ecologically sustainable lethal take of flying-foxes for crop protection'. Where this occurs, live, orphaned young may be given to a wildlife rehabilitator for the purpose of rehabilitation or humanely euthanased.

5.2.10 Seabirds:

contact EHP or a person who holds a permit that specifically provides for the rehabilitation of the relevant species.

6. Interpretations

6.1 Objectives

6.1.1 Objectives are the intended outcome(s) for each section of this code.

6.2 Standards

6.2.1 Standards describe the mandatory specific actions required to achieve acceptable levels of animal welfare and successful wildlife rehabilitation. These are the minimum standards that must be met. They can be identified in the text by the heading ‘Standards’ and the use of the word ‘must’.

6.3 Guidelines

6.3.1 Guidelines describe agreed best practice based on scientific information, accumulated experience and consultation. A guideline is usually a higher standard of care than minimum standards, except where the standard is best practice. Guidelines are identified in the text by the heading ‘Guidelines’ and the use of the word ‘should’.

7. Provision of veterinary care

7.1 Objective

7.1.1 To rapidly assess the veterinary requirements of sick, injured or orphaned protected animals and provide an appropriate level of relief from distress, pain and suffering as well as appropriate veterinary care.

7.2 Standards

7.2.1 A sick or injured animal must receive a standard of care appropriate for its injuries or illness as soon as possible.

7.2.2 An animal that is affected by a critical (see section 18 for definition) injury or illness must be provided with appropriate veterinary care. This includes the provision of appropriate and ongoing pain relief and monitoring by a suitably experienced and qualified person; or prompt referral to a person or organisation able to provide that care; or euthanasia as soon as possible using an approved method. For an approved euthanasia method refer to section 12 of this code.

7.2.3 An animal that is affected by a serious (see section 18 for definition) injury or illness, or that is likely to be suffering from moderate pain, must be provided with appropriate pain relief and veterinary care as soon as is practicable.

7.2.4 An animal that is affected by a mild (see section 18 for definition) injury or illness, or that is likely to be suffering only mild discomfort or pain, must be provided with appropriate veterinary care as soon as is practicable.

7.2.5 A person must **not** hold a critically or seriously ill or injured animal without providing appropriate veterinary care, when such veterinary care is reasonably accessible.

7.2.6 Unless authority has first been received from a conservation officer, a wildlife rehabilitator must **not** request a veterinarian to perform the following surgical procedures:

7.2.6.1 amputation of a limb, or part of a limb, other than a single digit

7.2.6.2 removal of an eye

7.2.6.3 amputation of more than one third of the tail of a mammal, bird or reptile, other than a skink, gecko or legless lizard

7.2.6.4 perform a procedure that results in the animal being unable to reproduce (sterilisation)

7.2.6.5 any other procedure that might reasonably be expected to reduce an animal's fitness or ability to survive upon release back into the wild.

7.2.7 Notwithstanding section 7.2.6, a surgical procedure must not be withheld if gaining authority from a conservation officer will result in an unacceptable delay that may contribute to unnecessary suffering.

7.2.8 Wildlife rehabilitators must take all reasonable steps to avoid or minimise stress on animals in care and must **not** deliberately or negligently expose an animal to unnecessary stress.

7.3 Guidelines

7.3.1 A wildlife rehabilitator or wildlife rehabilitation organisation should establish a working relationship with a veterinarian, veterinary practice or facility able to provide veterinary care for rescued native animals.

Note: For the purposes of this code an animal's injuries or illness may be described as:

Critical (see section 18 for definition);

For example: an animal that has been struck by a car and has a serious head injury.

Serious (see section 18 for definition);

For example: an animal with a closed fracture of a long bone, but no other apparent injuries, and that is bright, alert and responsive; a koala with severe cystitis.

Mild (see section 18 for definition);

For example: an animal that has sustained superficial cuts or bruising as a result of inter-species or intra-species fighting or an orphaned marsupial suffering from mild dehydration.

7.3.2 The determination of what is 'appropriate veterinary care' should take into account the circumstances and availability of veterinary facilities and expertise, and the nature and severity of the injuries and/or illness of the animal.

For example: 'appropriate veterinary care' has **not** been provided to a critically or seriously injured or ill animal if it has received only a single treatment, without ongoing veterinary care and/or monitoring.

Note: a person must **not** hold a seriously injured or ill animal overnight without appropriate veterinary treatment, when access to 24-hour veterinary care is available.

7.3.3 The most appropriate facility in the circumstances should be used for the provision of veterinary care to seriously sick or injured protected animals.

For example: when specialised wildlife veterinary facilities are readily available and accessible. These should be used in preference to a private veterinary surgeon.

8. Rescue and handling

8.1 Objective

8.1.1 To eliminate additional stress and further injury to wildlife during rescue and in care and to maximise the safety of rescuers and the general public.

8.2 Guidelines

8.2.1 A wildlife rehabilitator should not conduct a rescue when doing so would put themselves or other persons at risk of serious injury.

8.2.2 Wildlife rehabilitators should ensure that they utilise correct personal protective equipment (PPE) relevant to the species that they are rescuing.

For example: eye protection when handling waterbirds, gloves when handling bats, towels/blankets for handling most species, and covered footwear should be worn at all times. For rescues in bushland or long grass, rescuers should also wear long sleeved shirts and long trousers.

8.2.3 Prior to undertaking a wildlife rescue the rescuer should assess the associated risks and put in place measures to ensure the safety of themselves, others and the wildlife to be rescued.

8.2.4 Wildlife rescues should be carried out in a way that avoids significant disturbance to unaffected wildlife that is likely to cause injury or abandonment of young.

8.2.5 The rescue and handling of wildlife should **avoid** causing unnecessary pain, suffering or exacerbation of injuries.

8.2.6 The rescue and handling of wildlife should be done in a manner that will not cause or spread disease.

8.2.7 Only the appropriate equipment and techniques for the species and size of the animal concerned should be used. Equipment and techniques that should **not** be used include:

8.2.7.1 the noosing of a koala

8.2.7.2 the use of a projectile, other than a net-gun or tranquiliser dart by an appropriately trained and licensed person

8.2.7.3 the use of unpadded snake tongs

8.2.7.4 the use of a leg-hold trap with unpadded jaws or an unattended snare or automatically activated snare

8.2.7.5 the felling of a tree containing an animal, when the tree has a diameter at chest height (DBH) exceeding 5 centimetres (cm), or when injury to the animal being rescued or any other animal is a likely consequence, or when the tree is in a protected area.

8.2.8 Where the difficulty of a wildlife rescue is compounded by the presence of other persons or dangers such as heavy traffic, a rescuer should opt for the assistance of local authorities (i.e. local council or police) to mitigate these factors.

8.2.9 Where the rescue of animals in warm or hot ambient conditions (>24°C) cannot be avoided, or when the animal has been subject to exertion or physical restraint, rescuers should monitor the body temperature of the animal and/or seek appropriate veterinary assistance.

8.2.10 Rescuers should monitor healthy nestling and fledgling birds for abandonment rather than attempt to bring the bird into care. Nestlings can be returned to the nest or placed in an artificial nest. Fledglings can be returned to a tree where they were found or in some cases a tree nearby, if determined to be free of injuries or disease by a suitably qualified or experienced person.

8.2.11 Where possible, handling and restraint should be minimised and chemical restraint methods such as sedation and anaesthesia used whenever possible by those appropriately qualified and/or licensed to do so.

Note: Sedatives and anaesthetics must be administered by a veterinary surgeon or authorised person.

8.2.12 The use of padded snake tongs should be limited to situations in which there is no other alternative, and in which there is significant risk to human life. Snake tongs, even when padded, may cause significant internal injury, particularly to gravid (pregnant) snakes. Such injuries may **not** be immediately apparent and may result in the death of the snake weeks or months later.

8.2.13 Only persons who are vaccinated against rabies should handle any bat species.

9. Transportation

9.1 Objective

9.1.1 To transport wildlife in such a way that minimises further stress and injury and prevents escape. This section applies to the movement of all sick, injured or orphaned wildlife (e.g. from the point of rescue to a veterinary surgery and between rehabilitation facilities and to the release site).

9.2 Standards

9.2.1 Transport must not cause unnecessary pain or distress to the animal.

9.2.2 Sick, injured or orphaned wildlife must only be transported when and where necessary.

9.2.3 Transport containers must be appropriate for the species (i.e. the size, strength and behaviour of the wildlife being moved).

9.2.4 Transport containers must be designed and maintained in such a way as to:

9.2.4.1 prevent injury

9.2.4.2 prevent escape

9.2.4.3 prevent rolling or tipping during transit

9.2.4.4 prevent damage to plumage

9.2.4.5 be hygienic

9.2.4.6 minimise stress

9.2.4.7 be suitably ventilated.

9.2.5 Transport containers that hold species that are dangerous, venomous or capable of transmitting potentially fatal zoonoses must be clearly marked with a warning label such as 'Caution—venomous snake' or 'Caution—live bat', and must be locked and secured.

9.2.6 Wildlife must not be transported in a vehicle's boot that is separate from the main cabin without ventilation.

9.2.7 Non-compatible species, such as predator and prey combinations must not be transported in a manner that allows physical or visual contact.

9.2.8 Transport containers for wildlife must:

9.2.8.1 be secured to prevent movement during transport causing stress or injury to the animal

9.2.8.2 provide protection from direct sunlight

9.2.8.3 provide protection from wind and rain.

9.3 Guidelines

9.3.1 Transport containers that are **not** of a fully enclosed design should be covered to minimise light, visual stimulation and stress.

9.3.2 The use of medication during transport should be considered and approved by a veterinary surgeon.

9.3.3 The provision of water and food for adult animals is generally **not** required for short trips (2–3 hours). Food and water should be considered when transporting dependent young and adult animals during longer trips.

9.3.4 Wildlife should **not** be transported in the back of an uncovered utility vehicle unless the transport container is securely fastened.

9.3.5 Transport containers should be maintained within an appropriate temperature range for the species. Unfurred joeys and bird and monotreme hatchlings should be within the 31–34°C range. 25–27°C is appropriate in most other cases.

9.3.6 An experienced rehabilitator or veterinary surgeon should be consulted if it is uncertain what an appropriate temperature range is for a specialised species.

10. Housing

10.1 Objective

10.1.1 To ensure that wildlife undergoing rehabilitation are housed in a way that prevents injury or escape, minimises stress, maintains safe levels of hygiene and allows natural behaviours.

10.2 Standards

10.2.1 Enclosures must be constructed and maintained in such a way to prevent injury and escape and exclude predators and pests.

10.2.2 Enclosures must be appropriate for the species, and the types of injuries, stage of development and/or stage of rehabilitation of the animal being housed.

10.2.3 Enclosures must maintain habitat elements appropriate to the species and the condition of the animal (e.g. perching, nest boxes, resting forks, wading pools, suitable substrate).

10.2.4 Enclosures housing wildlife **not** subject to critical care must allow for the display of natural behaviour and support rehabilitation for survival in the wild.

10.2.5 All enclosures must meet the dimensions (relevant to the species in care) described in Appendix A of the code. These dimensions are regarded as the minimum standards that must be met.

10.2.6 All housing, including enclosures, nest boxes, bedding, substrate, perching, food and water bowls must be kept in a clean and hygienic condition.

10.2.7 Cleaning and disinfection regimes must be appropriate for the species and excreta must **not** be allowed to accumulate excessively in any enclosure, substrate or bedding.

10.2.8 Species that are dangerous to humans, venomous or those known to carry life threatening zoonoses must be securely contained to prevent unauthorised human contact and exposure to domestic animals.

10.2.9 Animals showing signs of infection or disease must be quarantined from other wildlife in care. Animals subject to quarantine must be housed in such a way as to prevent transmission of disease or infection to other animals.

10.2.10 Wildlife in care must **not** be exposed to other native or domestic animals where the exposure is likely to result in unnecessary familiarisation or stress.

For example: native wildlife and a domestic dog, cat or recognised predator sharing the same space or having contact.

10.2.11 Wildlife in care must **not** be exposed to odours or noises that are likely to result in unnecessary familiarisation, stress or illness. Use of certain aerosols and insect repellents can be toxic to animals in care and should be avoided.

For example: cigarette smoke in an enclosed area or loud music.

10.2.12 Incompatible species or individuals must not be housed in the same enclosure, or within sight of each other.

10.3 Guidelines

10.3.1 Enclosures should be designed to allow easy cleaning, easy access and minimise handling of wildlife.

10.3.2 Faeces and uneaten food should be removed daily (more frequently if needed) and disposed of in such a way as to limit access by other animals and the potential spread of disease.

10.3.3 Food and water containers should be cleaned with a suitable (non-toxic to wildlife) disinfectant daily.

10.3.4 Household and animal-related cleaning implements and products should be kept separate to avoid cross contamination.

10.3.5 Wildlife husbandry items should be cleaned in areas separate to those used to wash domestic or household items.

10.3.6 Rehabilitators should avoid mixed-species housing whenever possible and, when mixed-species housing is necessary (such as in pre-release bird aviaries), ensure that only compatible species are housed together. Any new additions to an existing aviary, colony or mob should be monitored closely for the first few days to ensure their safety and the safety of other individuals.

10.3.7 Animals that naturally form social groups in the wild should be housed with animals of an appropriate age and gender of the same species where possible. When animals are housed collectively, they should be individually identifiable.

10.3.8 Potential stressors that could have a detrimental health effect on an animal should be identified and removed from an enclosure. Ongoing or prolonged stress can result in reduced growth rates, weight loss, abnormal behaviour (e.g. self-mutilation), inhibited recovery and increased mortalities. More subtle and psychological signs of stress could be repetitive stress-related behaviour (stereotypical behaviour) such as pacing.

Note: If carers are in any doubt of an animal's capacity to deal with the unavoidable stresses of coming into care, or there are unknown causes for unusual behaviour, they should consult experienced carers for that species. Unmanaged issues relating to ongoing or prolonged stress while in care will compound the original health problems, making a full recovery less likely. Similarly, communication and cooperation between wildlife rehabilitators and rehabilitation organisations are encouraged to maximise the use of available appropriate housing and facilitate the housing of social species into groups at an appropriate stage and/or age prior to release, where possible.

11. Food and water

11.1 Objective

11.1.1 To ensure that sick, injured or orphaned wildlife receive a diet that supports their healthy recovery and development, and their effective rehabilitation and release.

11.2 Standards

11.2.1 Rehabilitators must be aware of the appropriate food and water requirements for the particular species in the wild and in care. Advice must be sought from a person experienced in rehabilitating a species where a rehabilitator is unfamiliar with its care.

11.2.2 Food and water of suitable quality and quantity for the species must be provided at an appropriate frequency and must not be accessible to other wild or domestic animals.

11.2.3 The feeding of live non-native vertebrate animals to an animal under rehabilitation must not occur unless the feeding of live food is essential for the rehabilitated animal's survival.

11.2.4 Live protected animals must not be used for the purpose of feeding an animal under rehabilitation. It is permissible to collect a dead least concern animal (e.g. fresh road kill), other than a special native animal (echidna, koala, platypus, wombat), if the dead animal is taken to feed the bird of prey kept under a rehabilitation permit.

11.2.5 Food quantities must be adjusted to reflect an animal's stage of development and to maintain a weight that is within an appropriate range. Guidance on this can be obtained from wildlife rehabilitation organisations and facilities.

11.2.6 Prior to release food must be offered in a way that encourages natural feeding behaviour such as foraging.

11.2.7 An animal that is unable or unwilling to feed sufficiently (other than nursing young) must be assessed by a veterinarian or a suitably experienced person to diagnose the cause of the inability to feed.

11.2.8 Prior to undertaking the force feeding of an animal, a rehabilitator must have received training from a suitably experienced person (i.e. experienced wildlife rehabilitator or veterinarian) for that particular species.

11.2.9 Food and water for wildlife must not be allowed to become contaminated by wild or domestic animals.

11.2.10 Food must be provided in a manner that minimises food contamination and spoilage and the transfer of disease.

11.3 Guidelines

11.3.1 To the greatest extent possible, captive diets should be similar to the natural diet for the species to minimise diet-related health issues, to teach food recognition for release back into the wild and promote normal digestive function.

11.3.2 Animals should be weighed at least weekly to determine overall health and to mitigate weight loss through dietary changes.

11.3.3 Vitamin and mineral deficiency is a disorder associated with prolonged captivity in a wide range of species, and should be anticipated and prevented by provision of a proper diet with vitamin and mineral supplementation. Care should be taken when adding supplements to an animal's diet as incorrect quantity can also cause dietary problems.

11.3.4 Whenever practicable, prior to release, animals should have foods included in their diet that would be available to them in the area where they are to be released.

11.3.5 To avoid contamination and disease transfer, wildlife and human food preparation areas and implements should be kept separate.

12. Euthanasia

12.1 Objective

12.1.1 To support the timely euthanasia of sick, injured or orphaned wildlife through identifying when euthanasia is appropriate.

Note: Euthanasia is a large part of wildlife rehabilitation and an important welfare tool. It should not be seen as a failure on the rehabilitator's behalf, nor should it be avoided at **all** costs.

12.2 Standards

12.2.1 All wildlife rehabilitators, whether individually licensed or operating under a group licence, must be able to provide for the euthanasia of wildlife when required.

12.2.2 Wildlife must be euthanased without exception when:

12.2.2.1 it is necessary to alleviate significant pain or suffering when such pain and suffering is not able to be managed by a veterinarian

12.2.2.2 further treatment is **not** practical or recovery is **not** expected such that the animal can be successfully rehabilitated to the wild

12.2.2.3 resources are **not** available to provide appropriate care or an acceptable quality of life throughout the likely rehabilitation period.

12.2.3 Animals with a poor prognosis for survival and that are suffering must be euthanased rather than left to die from the injury or illness. Failure to take appropriate steps to arrange the prompt euthanasia of these animals is a breach of the *Animal Care and Protection Act 2001*.

12.2.4 Unless EHP has granted permission for the animal to enter the Queensland Species Management Plan (QSMP) or unless otherwise advised by the EHP Director Wildlife Management, an animal must be euthanased when:

12.2.4.1 an orphaned animal is not viable or is unlikely to be rehabilitated

12.2.4.2 there is no suitable release location (refer to sections 15.2.4 and 15.2.6 regarding release/alternative release locations)

12.2.4.3 the ability to reproduce is lost due to an injury, disease or surgical procedure

12.2.4.4 the ability to move freely or normally (i.e. run, climb, crawl, hop, fly or swim) is permanently impaired due to, for example, a missing or impaired limb, wing, foot or tail, such that it will significantly impair the animal's ability to survive in the wild

12.2.4.5 the ability to sense environment (i.e. see, hear, smell, taste or feel) is permanently impaired due to a missing or injured organ such as an eye, ear or nose, such that it will significantly impair the animal's ability to survive in the wild

12.2.4.6 the ability to catch, find or handle food is permanently impaired

12.2.4.7 its advanced age renders it unlikely to survive in the wild.

12.2.5 The carcasses of euthanased animals must be discarded in accordance with the local regulations. Carcasses of animals euthanased using anaesthesia and/or veterinary euthanasia solutions may present a significant risk to scavengers, including native animals, and must be disposed of by deep burial or incineration.

12.2.6 Carcasses of animals euthanased by way of barbiturate overdose must not be fed to other animals.

12.3 Guidelines

12.3.1 Wildlife should be euthanased when suffering from injuries or illness that require a long and complicated rehabilitation process and when such wildlife provide little contribution to the conservation of the species.

12.3.2 Non-releasable wildlife should be euthanased (as per section 12) or referred for placement through the QSMP. For further information on non-releasable wildlife or the QSMP, contact your local EHP office.

13. How to euthanase

13.1 Objective

13.1.1 To support the timely euthanasia of sick, injured or orphaned wildlife by identifying who may perform euthanasia and what methods may be applied.

13.2 Standards

13.2.1 Methods of euthanasia, including methods of restraint for euthanasia, must not cause significant pain, suffering or distress.

13.2.2 Death must be confirmed prior to the disposal of the carcass.

13.2.3 Euthanasia by barbiturate overdose must only be performed by a veterinary surgeon or a competent and appropriately trained person authorised by the chief executive of Queensland Health to possess and use restricted drugs for veterinary purposes.

13.2.4 If euthanasia via intracardiac or intrathoracic (as opposed to intravenous) barbiturate overdose is performed then the animal must be fully anesthetised prior to performing the procedure.

13.2.5 The following euthanasia methods must **not** be used on wildlife:

13.2.5.1 suffocating via drowning, strangulation or chest compression

13.2.5.2 freezing

13.2.5.3 burning

13.2.5.4 poisoning with household products

13.2.5.5 air embolism

132.5.6 exsanguination or decapitation without stunning

13.2.5.7 electrocution or microwave irradiation

13.2.5.8 poisoning with any domestic or agricultural pest control agent, chemical or noxious agent not currently approved for the veterinary euthanasia of domestic animals.

13.3 Guidelines

13.3.1 Animals should be euthanased by barbiturate overdose while under general anaesthesia administered by a veterinary surgeon or an appropriately trained person authorised by the chief executive of Queensland Health to possess and use restricted drugs for veterinary purposes.

13.3.2 When it is **not** practicable to perform euthanasia using barbiturate overdose a method appropriate for the species that causes minimal pain and suffering should be used. This may include the following methods:

13.3.2.1 Large animals shot with a rifle of a calibre sufficient to achieve instantaneous insensibility followed by the rapid death of the animal without first regaining sensation or consciousness. In effect, the technique must destroy the brain.

Note: The use of a firearm for the euthanasia of wildlife must comply with the *Weapons Act 1990*.

13.3.2.2 Cranial trauma sufficient to cause instantaneous insensibility followed by the rapid death of the animal without first regaining sensation or consciousness. In effect, the technique must destroy the brain

Note: The brain of reptiles is very small in comparison with their head size, and well protected by the bones and soft tissues of the head. Cranial trauma techniques used on reptiles must cause instantaneous and complete destruction of the brain.

14. Release of rehabilitated protected animals

14.1 Objective

14.1.1 To ensure that only wildlife that possess an appropriate level of physical, cognitive and behavioural fitness are released to the wild.

14.2 Standards

14.2.1 Rehabilitated wildlife must be assessed as physically and behaviourally fit by a wildlife veterinarian or a rehabilitator experienced in that species prior to its release.

14.2.2 An animal must only be deemed physically fit for release if:

14.2.2.1 it has fully recovered from any pre-existing injury

14.2.2.2 reasonable steps have been taken to determine the animal is free of disease

14.2.2.3 its weight and body condition are within the normal range for the animal's age, sex and species

14.2.2.4 it has adapted to prevailing climatic conditions

14.2.2.5 it is not known to be sterile/unable to reproduce.

14.2.3 The following process must be followed regarding amphibians:

14.2.3.1 an amphibian must only be released in suitable habitat as close as practicable to the same location from which it was originally taken to minimise the potential spread of parasites and disease and impacts on genetic integrity.

14.2.3.2 it is **not** permissible to release an amphibian at a location that is only similar to or near the original location, or at a location that is only assumed to be the original location.

14.2.3.3 if the original location of the amphibian is not known, the animal may be suitable to enter into the QSMP. Contact your local EHP office to arrange for the animal to be assessed.

14.2.3.4 if the amphibian is not suitable to enter the QSMP, it must be euthanased.

14.2.4 An animal must only be deemed behaviourally fit for release if it:

14.2.4.1 can recognise, catch and consume naturally available food

14.2.4.2 has not been allowed to associate with domestic animals and predator species during the rehabilitation period so as to ensure that its natural instinct to recognise and avoid predators, including domestic animals, remains intact

14.2.4.3 is **not** attracted to humans or to sights, sounds or smells that are specific to captivity (i.e. it is **not** imprinted or humanised)

14.2.4.4 can navigate effectively through its natural environment

14.2.4.5 can recognise and interact appropriately with members of the same species.

14.3 Guidelines

14.3.1 Species that are required to construct shelters for survival (e.g. dig burrows or construct dreys) should exhibit this behaviour prior to release.

15. Release timing and site selection

15.1 Objective

15.1.1 To ensure that the release timing and site chosen for rehabilitated wildlife maximises the chances of survival in the wild and has minimal negative impact on wild populations.

15.2 Standards

15.2.1 Wildlife must not be released in weather conditions that are likely to cause significant hardship or reduced chances of survival.

15.2.2 To allow wildlife to immediately investigate its environment and avoid predation, release must take place during the species' normal period of activity (e.g. diurnal, nocturnal, crepuscular).

15.2.3 Migratory species must be released one month prior to their typical departure period or at a time when other members of the species are present if the location is within a migratory path. Due to time in care, the animal may need to be kept in care until the following migratory season.

15.2.4 If the location where the wildlife was found is known and is suitable for the release then the wildlife must be released there. A suitable environment for release is one that:

15.2.4.1 contains appropriate habitat, shelter, water and food resources

15.2.4.2 is free of immediate hazards or risks (i.e. not a roadside)

15.2.4.3 is known **not** to be subject to imminent land-clearing or development.

15.2.5 The release of koalas to the wild must be conducted in accordance with the relevant provisions outlined in the Nature Conservation (Koala) Conservation Plan 2006.

15.2.6 If the original site of capture is **not** appropriate for release (refer to section 15.2.4), then the animal must be released as close to the original site as possible. The rehabilitator needs to be aware of that particular species natural home range in order to provide the best alternative release location.

15.2.7 Wildlife must **not** be released into a national park unless the animal originated from the national park and prior approval has been obtained from EHP.

15.2.8 If a release is unsuccessful, despite repeated attempts to rehabilitate the animal for release to the wild, the animal must be euthanased (see section 12). If the animal is potentially suitable to enter into QSMP, the local EHP office must be contacted to arrange for the animal to be assessed.

15.2.9 Progeny of wildlife held on a rehabilitation permit must be released to the wild when self-sufficient. The progeny should be released at the location from where the mother originated, consistent with section 15.2.4 of the code.

15.2.10 Tagging, banding, or other marking, including microchip or PIT implanting, may only be performed by a person who is authorised by EHP to tag wildlife or by a registered veterinary surgeon, and must only be performed as part of an EHP approved program.

15.3 Guidelines

15.3.1 An animal should be released as soon as it is deemed ready and the conditions are suitable.

15.3.2 Environmental conditions should be suitable for the release, taking into account the weather and time of year which will help facilitate the animal's reintroduction to the wild and its survival. For example:

15.3.2.1 reptiles should be released during the warmer months such as spring and summer

15.3.2.2 juvenile animals should be released during natural dispersal periods

15.3.2.3 insectivorous species should be released during periods of insect abundance.

15.3.3 The release of rehabilitated animals into habitat other than that from which they originated, should be carefully considered as it increases the risk of undesirable ecological impacts, such as:

15.3.3.1 spread of diseases and parasites into native wildlife populations

15.3.3.2 genetic contamination of genetically distinct wildlife populations, or other deleterious genetic effects

15.3.3.3 impacts on stable social structures of wildlife populations residing in recipient habitat.

15.3.4 Gradual or 'soft' release is preferred for most species whenever practicable. Abrupt or 'hard' release is not advised for animals subject to long term care, orphans or those animals requiring social groups.

15.3.5 If social species are to be managed and released as a group, then all individuals within the group should originate from the same or neighbouring location, or be within the range of normal movement from their place of origin based on the species capacity to travel.

Example: A kangaroo can be released within 100 kilometres of its origin, based on its (the species) capacity to travel long distances.

15.3.6 Regarding migratory species that have been in care for extended periods, the rehabilitator should ensure that an appropriate level of physical fitness is achieved prior to release, allowing the animal enough time to establish itself in the wild in advance of the forthcoming migration.

15.3.7 Inexperienced rehabilitators should contact an experienced rehabilitator, rehabilitation group or EHP for advice on 'soft' release of animals with a close social structure such as bats (including flying-foxes), gliders and macropods.

15.3.8 Highly social species, excepting those individuals in critical care, should be held in appropriate groups as early as possible to enable a social unit to develop before release.

16. Records

16.1 Objective

16.1.1 To maintain comprehensive records of sick, injured or orphaned wildlife admissions, disposals and management while in care. These records can be used to track and review individual case histories and identify trends and represent a useful resource for rehabilitators, regulators, veterinarians, educators and research organisations.

16.2 Standards

16.2.1 A register must be kept by each wildlife rehabilitator for all protected animals rescued or cared for including:

- 16.2.1.1 date of admission or rescue
- 16.2.1.2 identifying number or name
- 16.2.1.3 reason for rescue
- 16.2.1.4 species
- 16.2.1.5 approximate age or age class (neonate, juvenile, sub-adult, adult, aged)
- 16.2.1.6 sex (M, F, Unknown)
- 16.2.1.7 exact location of rescue
- 16.2.1.8 brief description of health or injuries
- 16.2.1.9 treatments
- 16.2.1.10 relevant observations (behaviour, diet, general progress)
- 16.2.1.11 regular weights
- 16.2.1.12 final outcome (released, died, euthanased, permanent care, transferred to another person/organisation)
- 16.2.1.13 date of final outcome
- 16.2.1.14 if transferred to another person or organisation, to whom.

16.2.2 If an animal is transferred to another rehabilitator, copies of relevant records must accompany the animal.

16.2.3 All records must be maintained in a form that can be readily examined, analysed and clearly understood, and be made available to a conservation officer upon request.

16.3 Guidelines

16.3.1 Copies or backups of records should be kept to avoid information being lost.

16.3.2 To gauge the effectiveness of various rehabilitation and release techniques, post-release sightings of known rehabilitated wildlife should be recorded and kept.

17. Wildlife rehabilitation organisations

17.1 Objective

17.1.1 To identify the roles and responsibilities of wildlife rehabilitation organisations when operating under a group rehabilitation permit.

17.2 Standards

17.2.1 An organisation conducting wildlife rescue and rehabilitation activities in Queensland must be a legal entity (incorporated association or Australian company) and hold a valid rehabilitation permit issued under the *Nature Conservation Act 1992* by EHP.

17.2.2 A licensed wildlife rehabilitation organisation must ensure that:

17.2.2.1 all members engaged in wildlife rehabilitation activities comply with this code

17.2.2.2 the organisation and its members comply with the conditions of their rehabilitation permit

17.2.2.3 the organisation provides a current copy of the rehabilitation permit to members stating the period of membership and what species the member is endorsed to care for, together with the total number of animals that the member is entitled to hold, under the group rehabilitation permit

17.2.2.4 the organisation provides new and inexperienced members with appropriate and ongoing training and mentoring for species that the individual rehabilitator wishes to care for

17.2.2.5 membership lists are updated and forwarded annually within 20 business days at the close of each financial year to Permit and Licence Management, EHP, palm@ehp.qld.gov.au or GPO Box 2454, Brisbane QLD 4001

17.2.2.6 a process is established for handling alleged breaches of this code, or non-compliance with other relevant rules of the organisation

17.2.2.7 a procedure is established for responding to complaints against members either from external or internal parties (all new members must be given copies of this procedure)

17.2.2.8 all members are given timely, clear and detailed directions by the organisation concerning the activities that the member may carry out under the rehabilitation permit.

17.2.3 The organisation must advise EHP in writing within 20 business days of any person who is no longer a member and that they are no longer permitted to operate under the permit.

17.2.4 If the organisation becomes aware that a member operating under the permit does **not** comply with this code, the organisation must:

17.2.4.1 identify the actions or steps needed to be taken by the member to comply with this code and time frames associated, and

17.2.4.2 take responsibility for the individuals' actions under the group permit, and either

17.2.4.3 limit the authority of the member to operate under the permit, or

17.2.4.4 instruct the person in writing that they are no longer permitted to operate under the permit.

17.3 Guidelines

17.3.1 Organisations should inform prospective new members of relevant matters such as the financial costs and time commitment required by the individual.

17.3.2 All wildlife rehabilitators operating under a group wildlife permit should conduct themselves according to that group's membership requirements to the extent the law permits.

17.3.3 Wildlife rehabilitation organisations should endeavour to familiarise themselves with recently updated information about diseases in wildlife. This can be done by contacting the Australian Wildlife Health Network, the Wildlife Disease Association or Biosecurity Queensland.

Note: Wildlife rehabilitation organisations are permitted to undertake fundraising activities to support member training and assist with the acquisition of resources such as husbandry items, veterinary support and food.

18. Definitions

Act—the *Nature Conservation Act 1992*.

Administration Regulation—the *Nature Conservation (Administration) Regulation 2006.*

Animal—any member of the animal kingdom (other than humans) as defined in the Act.

Conservation officer—a person who is appointed as such by the responsible Minister under the *Nature Conservation Act 1992.*

Crepuscular—pertaining to early in the morning and late in the afternoon.

Critical—when the animal is affected by: major traumatic injuries, difficult breathing, major bleeding, serious head injury, or disembowelment; or is showing any signs of severe pain or discomfort; or has obvious injuries or illness that might cause the death of the animal; or is rescued or found in circumstances which might reasonably be expected to have caused such injuries or illness, even if they are **not** apparent (for example: dog attack); or the animal is moribund.

Critical care—a level of care provided to wildlife suffering from life threatening injuries or illness. Generally, wildlife in critical care will require short-term housing that reduces activity and facilitates easy observation, feeding, treatment and rehydration as required.

Diurnal—pertaining to day time.

Euthanasia—to achieve humane destruction of an animal. The method must achieve instant insensibility followed by rapid death of the animal without it first regaining sensation or consciousness.

Experienced rehabilitator/person—a person with a minimum of two (2) years, ongoing demonstrated wildlife rehabilitation experience specific to that species or a similar species of sick, injured or orphaned wildlife.

Exsanguination—death caused through loss of blood.

Hard release—where an animal is released directly to the wild without further support, feeding or environmental conditioning. It should only be used in the case of short-term rehabilitation and is not advised for animals in long-term care, orphans or social animals.

Mild—when the animal's injuries or illness appear to cause little discomfort, pain or loss of function, and are not life-threatening or likely to become life-threatening without immediate treatment.

Nocturnal—pertaining to the night.

Permit—a rehabilitation permit issued under the Act.

Protected wildlife—an animal that is prescribed as such in the Act.

Qualified person—a person who has completed a training course approved by the chief executive of Queensland Health and is issued with an authority under the provisions of the Health (Drugs and Poisons) Regulation 1996 or a person registered by the Veterinary Surgeons Board as a Veterinary Surgeon.

Quarantine—where an animal is kept isolated for a period to ensure it does not transmit or contract disease or parasites. Rehabilitators should take precautions when entering and leaving such isolated areas, utilising disinfectant footbaths, overalls etc. The same practice should apply to all husbandry equipment used for managing an animal in quarantine.

QSMP—the Queensland Species Management Plan. This is the process for placing zoologically required species or specimens into zoo collections for conservation/education purposes in lieu of being released successfully.

QWRC—the Queensland Wildlife Rehabilitation Council.

Rehabilitation organisation—a corporation or association holding a valid rehabilitation permit whose members engage in the rehabilitation of sick, injured or orphaned wildlife.

Rehabilitator—a person who is engaged in the rehabilitation of sick, injured or orphaned wildlife and is operating under a valid rehabilitation permit either as an individual or as member of a rehabilitation organisation.

Serious—when the animal is affected by serious injuries or illness that might reasonably be expected to cause moderate pain, but are **not** immediately life-threatening; and the animal is **not** showing obvious signs of distress or pain, or significantly reduced mental activity.

Soft release—where an animal is released with the provision of supplementary food, shelter and water at the site of release, preferably with a period of confinement during which time the animal(s) become familiar with the surrounding habitat, wildlife population and supplementary resources.

Veterinary surgeon—a person registered as a veterinary surgeon under the *Veterinary Surgeons Act 1936*.

Veterinary treatment—the conduct and application of veterinary surgery and veterinary medicine when applied to sick, injured or orphaned animals by a veterinary surgeon.

Wildlife—a protected animal as defined in the Act.

Wildlife Management Regulation—the Nature Conservation (Wildlife Management) Regulation 2006.

Wildlife Regulation—the Nature Conservation (Wildlife) Regulation 2006.

Zoonosis (plural zoonoses)—any infectious disease that can be transmitted from both wild and domestic animals to humans.

19 Appendix A: Minimum enclosure size

19.1 Objective

19.1.1 To identify appropriate enclosure sizes for rehabilitation purposes for each animal group.

19.2 Standards

19.2.1 **Critical care housing** must be housing that is designed to reduce an animal's level of physical activity for a short period of time and that facilitates frequent monitoring, treatment, feeding or rehydration. Once an animal no longer requires critical care it must be transitioned to an 'intermediate care' or 'pre-release' enclosure.

19.2.2 **Intermediate care housing** must be housing that is designed to allow sufficient space for some physical activity while enabling the animal to be readily caught for monitoring or treatment.

19.2.3 **Pre-release housing** must be housing that allows an animal to regain better physical condition, display natural behaviour and acclimatise to normal weather conditions. While in pre-release housing, interactions between wildlife and humans must be greatly reduced. The pre-release enclosure sizes listed in the tables below are regarded as the minimum standards that must be applied. Rehabilitators are encouraged to exceed these sizes if possible.

19.2.4 The maximum number of individuals listed in column four of the table below can be applied to both intermediate care and pre-release housing sizes. Critical care housing sizes are for individuals. For each additional animal the floor area of all enclosures must be increased by 50%. However this does not apply to clutch mates or siblings of the same age where individual territorial boundaries are minimal.

19.2.5 While in intermediate care and pre-release housing a waterbird must be provided with a pond that contains soft substrate and meets the area specified for the animal in the table below. This area must be increased by 50% for each additional waterbird. However this does not apply to clutch mates or siblings of the same age where individual territorial boundaries are minimal.

19.2.6 The requirement for pond size to be a percentage of the total floor area does not apply if the pond size exceeds 100 square metres (i.e. 10m x 10m).

Note: The tables below are standards which **must** be followed however where enclosure dimensions fall short by a small amount e.g. 0.23 instead of 0.25 leeway may be granted.

These standards are in place as a **minimum** requirement.

For the purpose of achieving best practice for protected animals in care, rehabilitators should seek to exceed the below dimensions whenever possible for better animal welfare and management.

All rehabilitators should take care to identify individual animals that may require additional space or demonstrate the need for specific requirements to achieve a positive conservation outcome. When the capacity to care for such individual animals is limited, rehabilitators should seek advice from experienced individuals or rehabilitation organisations and make arrangements that are more appropriate (e.g. alternative placement of such individual animals).

Birds

Type of bird (examples)	Critical care L x W x H (m)	Intermediate care L x W x H (m)	Pre-release L x W x H (m)	Maximum number of individuals	Pond size (as % of total floor area)
Small passerines (finches and wrens)	0.2 x 0.2 x 0.2	1 x 0.7 x 0.7	1.5 x 1.3 x 2	6	N/A
Medium passerines (parrots and pigeons)	0.4 x 0.4 x 0.4	1.5 x 1 x 1	2.9 x 1.5 x 1.8	4	N/A
Large passerines (parrots, pigeons, magpies and cockatoos)	0.5 x 0.5 x 0.5	1.2 x 0.8 x 0.8	4 x 2 x 2	4	N/A
Small waterbirds (ducks and grebes)	0.5 x 0.5 x 0.5	2 x 1.5 x 1	4 x 2 x 2	4	50%
Large waterbirds (swans and herons)	1 x 1 x 1	2 x 2 x 1.2	6 x 3 x 2	2	50%
Small aquatic/sea birds (gulls, cormorants and terns)	0.5 x 0.5 x 0.5	1 x 0.6 x 0.6	4 x 2 x 2	2	50%
Large aquatic/sea birds (albatrosses and pelicans)	1 x 1 x 1	4 x 2.5 x 1.5	6 x 3 x 2	2	50%
Small raptors (kestrels and hobbies)	0.5 x 0.5 x 0.5	2 x 2 x 2	5 x 3 x 3	2	N/A
Medium and Large raptors (kites, large falcons, goshawks, eagles and buzzards)	0.8 x 0.8 x 0.8	4 x 3 x 3	15 x 4 x 4	2	N/A
Emu chicks and adult brush-turkeys	0.7 x 0.7 x 0.7	2 x 2 x 2	5 x 3 x 2	2	N/A
Emus (other than chicks) and cassowaries	1.5x1 x 1	3 x 3 x 2	10 x 10 x 2	2	N/A

Reptiles

Type of reptile (examples)	Critical care L x W x H (m)	Intermediate care and pre-release L x W x H (m)	Maximum number of individuals	Pond size (as % of total floor area)
Geckos and small skinks (garden skinks)	0.1 x 0.1 x 0.1	0.6 x 0.6 x 0.6	2	N/A
Large skinks (blue-tongue lizards)	0.6 x 0.4 x 0.2	1 x 0.4 x 0.2	2	N/A
Small dragons (bearded dragons)	0.3 x 0.2 x 0.2	0.8 x 0.3 x 0.3	2	N/A
Monitors and large dragons (lace monitors)	1.2 x 1 x 0.6	4 x 3 x 2	2	N/A
Small venomous snakes (death adders) up to 80cm	0.5 x 0.3 x 0.2	0.7 x 0.6 x 0.5	2	N/A
Large venomous snakes (eastern brown snakes) over 80cm	0.6 x 0.4 x 0.4	1.20 x 1 x 0.6	2	N/A
Small pythons (spotted pythons)	0.4 x 0.3 x 0.2	1 x 0.6 x 0.5	2	N/A
Large pythons (carpet pythons)	1.2 x 0.5 x 0.5	2 x1.5 x 1.5	2	N/A
Small freshwater turtles (eastern snake-necked turtles) up to 15cm shell	0.6 x 0.4 x 0.4	1.8 x 0.6 x 0.4	2	50%
Large freshwater turtles (broad-shelled turtles) over 15cm shell	1 x 0.5 x 0.4	2 x 1.2 x 0.9	2	50%

Mammals

Type of mammal (examples)	Critical care L x W x H (m)	Intermediate care L x W x H (m)	Pre-release L x W x H (m)	Maximum number of individuals
Small bats (microbats)	0.3 x 0.2 x 0.3	0.5 x 0.5 x 0.5	5 x 3 x 2	10
Large bats (megabats)	0.8 x 0.6 x 0.6	1 x 1 x 1 (for single animals)	10 x 4 x 2	30
Small dasyurids and rodents (antechinus and mice)	0.3 x 0.2 x 0.2	0.5 x 0.5 x 0.3	1 x 1 x 0.3	4
Large dasyurids and rodents (quolls, phascogales and water rats)	0.5 x 0.3 x 0.5	1 x 1 x 1	3 x 2 x 2	4
Bandicoots, potoroos and bettongs	0.5 x 0.5 x 0.5	1 x 1 x 1	4 x 3 x 2	4
Small macropods (pademelons)	0.7 x 0.7 x 0.5	3 x 2 x 1.5	10x 10 x 2	4
Medium macropods (wallabies and rock-wallabies)	1.5 x 0.8 x 1	4 x 3 x 1.5	20 x 20 x 2	4
Large macropods (grey kangaroos)	1.5 x 0.7 x 1.5	5 x 5 x 2	40 x 20 x 2	4
Small possums and gliders (pygmy-possums and feathertail gliders)	0.3 x 0.2 x 0.5	0.6 x 0.3 x 1	2 x 1 x 2	10
Large possums (ringtail and brushtail possums)	0.5 x 0.5 x 0.8	1 x 1 x 1	3 x 2 x 2	2
Large gliders (greater gliders and sugar gilders)	0.4 x 0.3 x 1	1 x 1 x 1	6 x 3 x 3	6
Koalas	0.7 x 0.7 x 0.7	2 x 1 x 2	4 x 3 x 3	2
Echidnas	0.5 x 0.5 x 0.5	1.5 x 1.5 x 1	5 x 4 x 1	2

Note: Persons and organisations are reminded to refer to **Section 10—Housing standards and guidelines** in the code to ensure wildlife undergoing rehabilitation is housed in a way that prevents injury or escape, minimises stress, maintains safe levels of hygiene and allows natural behaviours.