Adani Mining Pty Ltd

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Carmichael Coal Mine and Rail SEIS

Report for Black-throated finch On-site Monitoring Survey 2

Rev 0

February 2014

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1. Introduction

1.1 Project overview

Adani Mining Pty Ltd (Adani, 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 'significant project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736) (now known as Department of the Environment). 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 for the Project 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)
- Great Barrier Reef Marine Park (GBRMP) (sections 24B & 24C)
- Protection of water resources (sections 24D & 24E).

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 Project 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 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: five local quarries to extract quarry materials for construction and operational purposes.

1.2 Previous work

The black-throated finch (southern) (*Poephila cincta cincta*), is listed as endangered under the EPBC Act and as endangered under the *Nature Conservation Act 1992* (Qld) (NC Act). Previous terrestrial ecological surveys conducted by GHD (2011;2012) as part of the Project EIS and subsequently by Ecology and Heritage Partners Pty Ltd (unpublished data, 2012) identified large numbers of the black-throated finch (southern), on the proposed Mine site and opportunistically within the broader Moray Downs property adjacent to the Mine site.

In discussion with the DSEWPaC (now known as Department of the Environment) and the Black-throated Finch Recovery Team, Adani committed to the development and implementation of an additional monitoring program, to gain a better understanding of the population size, seasonal movements and key habitats and potential nesting areas used by the black-throated finch, both at the Mine and adjacent Moray Downs and Bygana properties.

To this end, a draft Black-throated Finch Adaptive Monitoring Plan has been prepared comprising a four part monitoring program including:

- Regional distribution (species distribution modelling)
- Regional distribution (surveys)
- Local monitoring (observational) on the Mine Area
- Local monitoring (detailed) on the Mine Area

Details of this monitoring program are more fully described in the MNES report (GHD 2013a) Surveys undertaken as part of the black-throated finch monitoring program to date include:

- Black-throated finch surveys undertaken in May 2012 as part of the Project EIS (37 survey sites)
- Black-throated finch monitoring survey 1, undertaken in May 2013 (52 monitoring sites)
- Black-throated finch monitoring survey, undertaken in August 2013 (15 additional monitoring sites)

Results from the first phase of targeted black-throated finch monitoring undertaken in May 2013 are reported in GHD (2013b) however results from the surveys undertaken in August 2013 are included in this report. Data derived from these surveys will be incorporated into a Black Throated Finch Management Plan for the Project to more effectively target management and mitigation measures most relevant to the Project Mine and proposed offset areas. This report described the outcomes of the black-throated finch monitoring survey 2, undertaken in October

2013, which comprised of monitoring for part 3 of this monitoring program - *Local monitoring (observational) on the Mine Area.*

1.3 Study Area

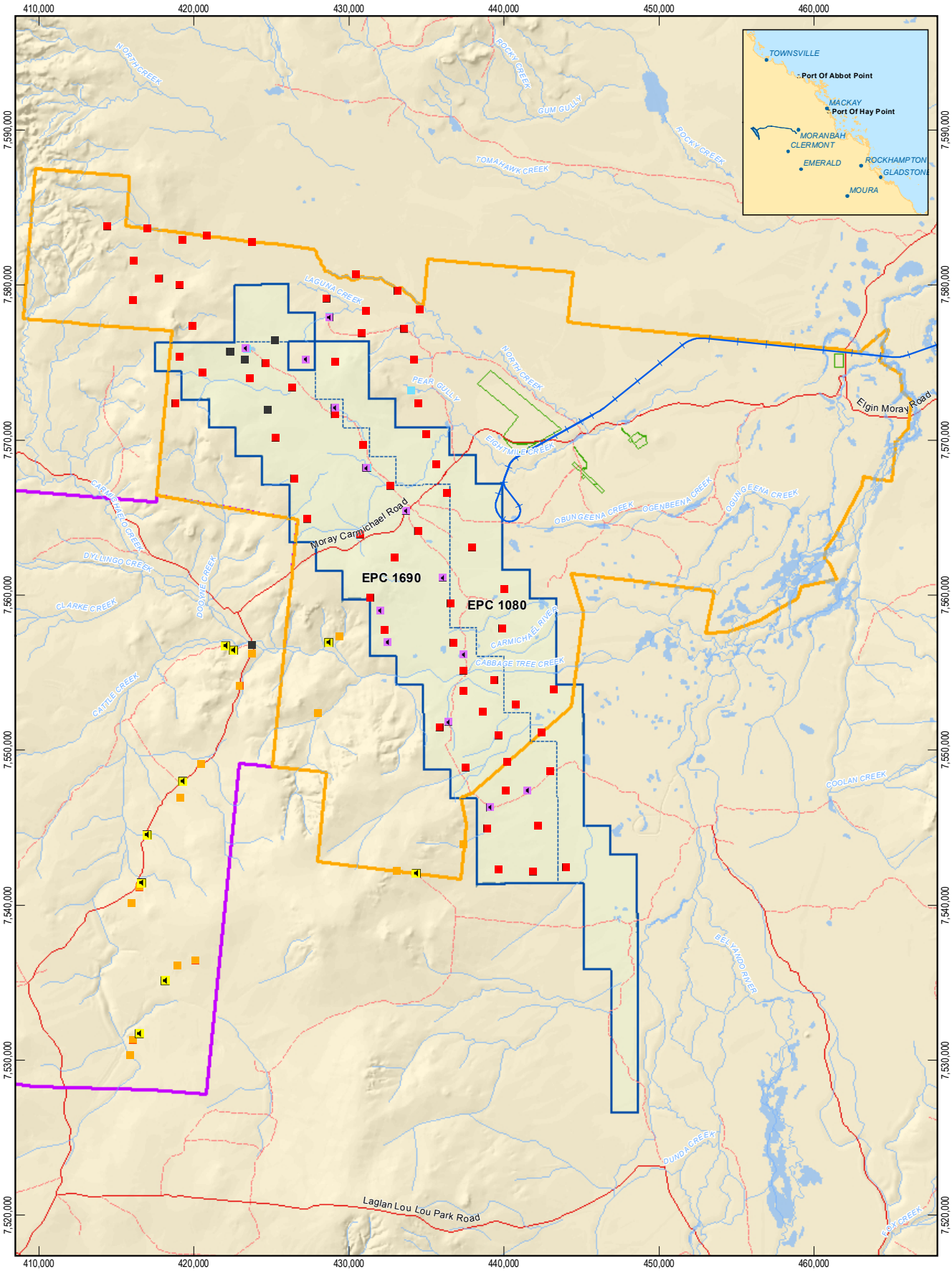
The Study Area comprises the Mine site and adjacent Moray Downs and Bygana properties. Figure 1-1 shows the Study Area and all two hectare (ha), water body and camera trap locations that were sampled in the October 2013 survey. All black-throated finch records recorded in this survey period (Table 3-1) are also marked.

An initial inspection of the the adjacent Doongmabulla property was also undertaken to broaden knowledge of the species local distribution and use of habitats and inform the ongoing process through which appropriate offset areas will be selected. Doonmabulla, located to the south-west of EPC1690, is one of a number of potential offset sites that have been identified.

1.4 Purpose

The purpose of this report is to present the results from the black-throated finch on-site monitoring survey 2, which was undertaken across the entire 67 x 2 ha woodland habitat survey sites in October 2013 (referred to as the current survey). Results from previous monitoring events undertaken in May 2013 (52 x 2 ha woodland habitat sites) and August 2013 (15 x 2 ha woodland habitat sites) will also be discussed in this report (collectively referred to as previous monitoring events). The aim of this component of the monitoring is to undertake repeated and systematic surveys of black-throated finch (southern) distribution and habitat at the Mine Area to collect more detailed data regarding (i) habitat preferences, local habitat use (i.e. hotspots), preferred habitat structure and vegetation composition, diet, nesting sites and reliance on mixed species flocks, (ii) temporal variation in habitat use, (iii) coarse population estimates and any spatial and temporal variation in numbers, and (iv) response to existing land management effects (i.e. grazing, fire, weeds, water array).

The intent of this monitoring was to stratify and mark a series of permanent 2 ha plots across the Study Area, as well as identify and survey water bodies via observation and camera traps. These methods are described in more detail in Section 2.



LEGEND

BTF survey sites October 2013
- Water
- Camera
- 2ha
- Incidental
- 2 Ha (preliminary assessment)
- Remote camera (preliminary assessment)
- Watercourse
- Waterbody
- Minor Road
- Track
- Moray Downs property
- Doongmabulla property
- Project (Mine)
- Mine (Offsite)
- Project (Rail)

1:350,000 (at A4)

0 2 4 6 8 10

Kilometres

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

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The Study Area indicating survey locations (and types) and black-throated finch records for the October 2013 monitoring

Job Number	41-26422
Revision	A
Date	25-02-2014

Figure 1-1

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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: GA: Road, Watercourse (2007); DME:EPC1690 (2010), EPC1080 (2011); DNRM: Waterbody (2010); GHD: (DNRM) Property, October monitoring sites (2013) Adani: Offsite Infrastructure, Alignment (2013).

2. Methods

2.1 Field assessment

The surveys reported here were undertaken over the period 20 – 29 October 2013, during the late dry season. Conditions in the months immediately preceding the surveys were exceptionally dry (relative to normal dry season conditions). Though the black-throated finch survey guidelines recommended wet season surveys for species in areas north of latitude 23° (DEWHA 2009a;DEWHA 2009b), the intent of this monitoring in the Study Area is to record data on the seasonal and annual variation in patterns of black-throated finch habitat use and ecology. This is important for well-targeted future management of the species on the Mine. Four fauna ecologists with previous experience at the Mine and with black-throated finch surveys participated in the monitoring.

The monitoring employs a combination of three survey methods based on the recommendations within the Significant Impact Guidelines for the black-throated finch (southern) *Poephila cincta cincta* (DEWHA 2009a;DEWHA 2009b); water body watches; area counts; and remote fauna cameras. Where black-throated finch were encountered, the following recommended observation data (DEWHA 2009a;DEWHA 2009b) was collected; the number observed, the number of adults and juveniles, observations on feeding, drinking, perching, preening, begging by young, flighting, nesting and mating. The field methods are consistent with the previous monitoring report (GHD 2013b) and have been reiterated here, so that this report can be understood independently of the previous work.

2.2 Site stratification

Prior to the establishment of the monitoring sites, the Study Area was stratified via vegetation type, level of vegetation disturbance, elevation and distance to water, all of which are considered to influence the presence or absence of black-throated finch regionally (Black-Throated Finch Recovery Team 2007;DEWHA 2009a;DEWHA 2009b) and in the Study Area (GHD 2011;GHD 2012). Monitoring sites were stratified by:

- Distance from water < 1 km and > 1 km from water (artificial and natural)
- Elevation >250 m and < 250 m
- Remnant and non-remnant vegetation
- Suitable and not suitable black-throated finch habitat (based on known use at the site and elsewhere)

The intent was not just to target known suitable habitat for the black-throated finch but to monitor a range of sites to understand the spatial variation of habitat use over time, and whether there were areas that are used more consistently than others, and therefore requiring targeted management.

The selection of water bodies to undertake counts and establish camera traps was undertaken via reference to locations where black-throated finch were previously recorded, and detailed water body mapping provided by Adani. However, as black-throated finch also use small ephemeral watering areas, (often in scrapes and drainage lines), it was expected that many of the sites chosen to observe or camera trap would be undertaken on an *ad hoc* basis, though

recognising that in the dry season these would mostly disappear and permanent water sources would then be the main target.

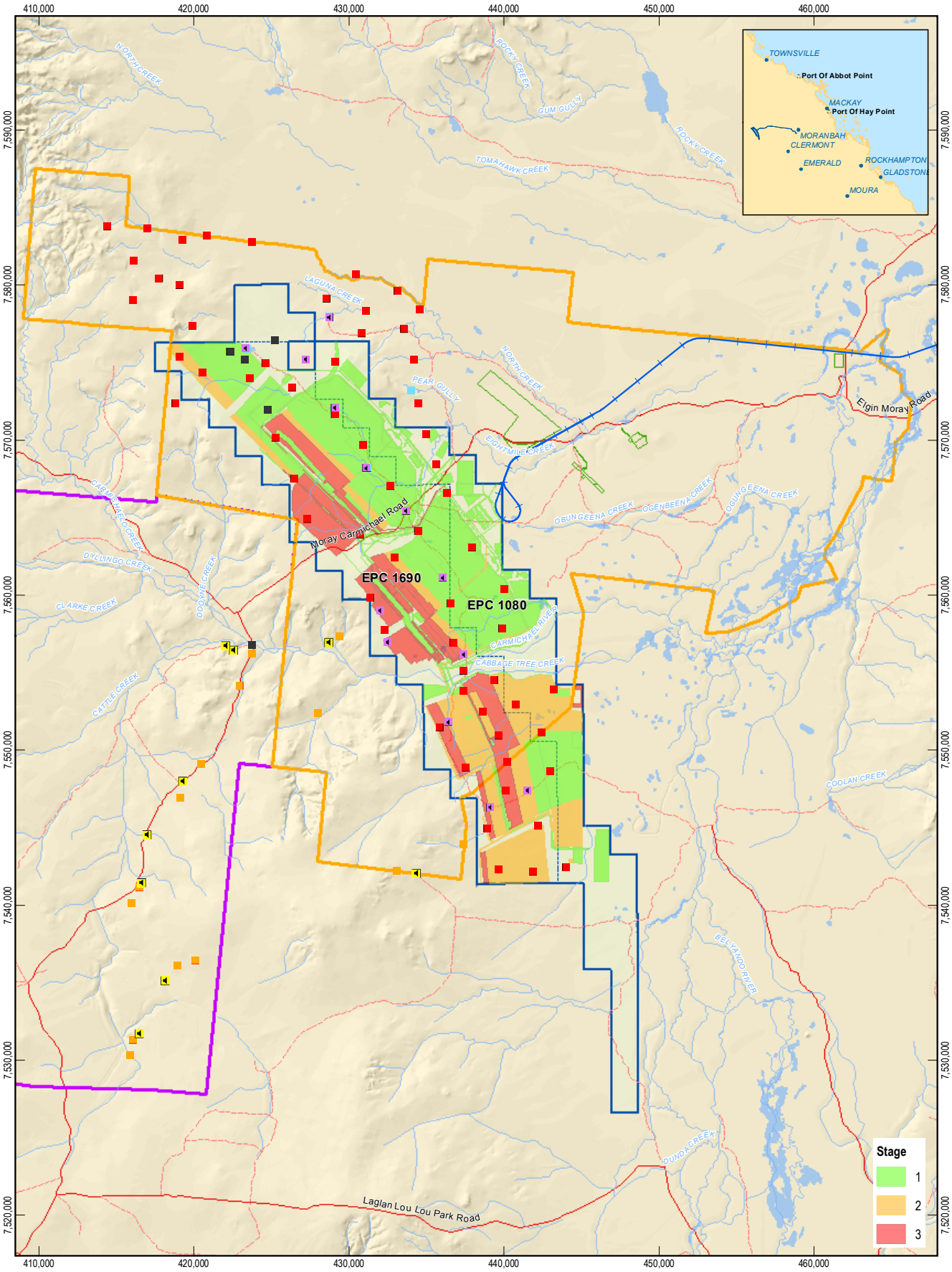
2.3 Mine stage plan

The monitoring plan will be an adaptive process that evolves over the course of the project. To understand the timing and magnitude of impacts on ongoing monitoring locations, monitoring locations have been overlayed on the mine stage plan. The Carmichael Coal Mine is proposed to be constructed in three stages. Impacts in stage one are planned to occur between years 2014 and 2024, impacts in stage two are planned to occur between years 2025 and 2034 and impacts in stage three are planned to occur between year 2035 and 2071. In addition to differences in the timing of impacts between monitoring locations, the magnitude of impact will vary between domains (open cut or underground). Table 2-1 outlines the number of monitoring sites within each mine stage and domain. Of the 67 2 ha monitoring site undertaken to date, 33 sites are not located in areas to be directly impacted by the mine. Some of these monitoring sites may be used to meet longer term research objectives. Figure 2-1 overlays the monitoring locations with the mine stage plan. This provides a basis for further development of the monitoring strategy by identifying long-term and immediate monitoring priorities.

Table 2-1 Number of monitoring sites located in each stage and domain

Mine Stages	Open cut		Underground	
	2ha	camera	2ha	camera
Stage 1 (year 2014 - 2024)	15	6	3	2
Stage 2 (year 2025 - 2034)	4	1	4	3
Stage 3 (year 2035 - 2071)	4	1	4	2

Monitoring locations were stratified by distance to water, elevation, presence of remnant vegetation and habitat suitability for black-throated finch (refer Section 2.2) and targeted areas that will be directly impacted by the mine. Due to the staged mine plan, it will be possible to undertake long-term monitoring at some of these monitoring locations, particularly those in Stage 2 and Stage 3, which are not scheduled to be directly impacted for 11 years and 21 years respectively. It is envisioned that as the management plan evolves, additional monitoring sites will be established in areas outside the impact area, and particularly in offset areas. This will provide information on the local distribution and utilization of habitats by the black-throated finch and provide a reference for comparison with impacts to habitats within the Mine Area.



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Kilometres

Map Projection: Universal Transverse Mercator
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Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS

Job Number 41-26422
Revision A
Date 27-02-2014

The Study Area indicating survey locations (and types) on mine stage plan

Figure 2-1

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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: GA: Road, Watercourse (2007); DME:EPC1690 (2010), EPC1080 (2011); DNRM: Waterbody (2010); GHD: (DNRM) Property, October monitoring sites (2013) Adani: Offsite Infrastructure, Alignment (2013).

2.4 Water body counts

In the current survey, 16 water bodies were identified for water body counts to target black-throated finch (Table 2-2). Watches were conducted by at least two people and up to four, and included at least one person watching for the full duration of the watch and one person surveying the surrounding habitat (600 m radius of water source), as recommended by the Significant Impact Guidelines (DEWHA 2009a). To increase the number of water bodies surveyed, searches were also conducted when camera traps were being installed. Past surveys in the Study Area indicated that black-throated finches are often observed sitting quietly near water sources, especially during the heat of the day. Rapid searches around water bodies are therefore, quite valuable. However more substantial water bodies were searched for longer periods (i.e. 10 Mile Bore, 10 Mile Number 1 Dam). These locations are mapped in Figure 1-1.

Table 2-2 Location of water body counts

Site	Type	Month	Year	Time (hrs)	East	North
4 Mile Dam	Dam	October	2013	0.6	436047.0	7561138.0
Swamp Tank Dam	Dam	October	2013	0.6	437386.0	7556168.0
Trough 1 South Of Bygana	Trough	October	2013	0.3	439096.2	7546323.6
Trough 3 South Of Bygana	Trough	October	2013	0.6	439097.0	7546320.7
Trough 2 South Of Bygana	Trough	October	2013	1.8	441533.8	7547414.4
Humes Bore	Dam	October	2013	1.3	432492.0	7556974.0
Labona Bore	Trough	October	2013	0.3	433685.0	7565430.0
10 Mile Number 1 Dam	Dam	October	2013	5.0	431186.4	7568219.3
Number 2 Dam	Dam	October	2013	1.5	429082.0	7572104.0
10 Mile Bore	Dam	October	2013	5.5	423382.0	7575879.0
10 Mile Tank	Dam	October	2013	2.0	428716.0	7577948.0
4 Mile Bore	Trough	October	2013	1.0	427210.0	7575210.0
4 Mile Dam Trough	Trough	October	2013	1.0	427210.0	7575210.0
Rocky Dam	Dam	October	2013	1.0	434000.0	7573210.0
Carmichael Bore	Trough	October	2013	2.0	436402.0	7551819.0
Trough South of Humes Bore	Bore	October	2013	0.3	432012.0	7559007.0

2.5 Two hectare searches

A total of 67 x 2 ha woodland habitat survey sites have been identified and permanently marked; 52 in May 2013 survey and 15 in August 2013. For the current survey, 2 x 20 minute two bird counts were undertaken at each of these 67 survey sites, recording all bird species encountered (seen or heard), abundance and whether they were operating in a mixed flock (sensu Vanderduys*, et al.* 2012). These standardised bird counts follow the method recommended by Bird Life Australia (Barrett*, et al.* 2003). The two bird surveys at each site were undertaken throughout the day; however, efforts were made to survey each site at least once in the premium survey period, between dawn and 3 hours after dawn. The location and description of these sites is presented in Appendix A and the locations are mapped in Figure 1-1.

2.6 Camera traps

For the current survey, seventeen of the available 20 cameras (ScoutGard SG560Z-8M) were installed at a range of dams and troughs. Three cameras were not operational. No ephemeral water sources were found due to the extremely dry conditions and were therefore not targeted. All were set on the first day of survey (21 October) and collected on the final day of survey (26 October). Cameras were installed at water sources where easy access to watering points was available for black-throated finches (southern), (e.g. banks flat and with sparse vegetation and shallow water). Vegetation was removed from in front of the lens, to avoid the system being triggered by vegetation during windy conditions. After collection, cameras where brought back and the images were downloaded for viewing. The location and description of the camera traps sites is presented in Table 2-3 and the locations are mapped in Figure 1-1.

Table 2-3 Location of the camera traps

Site	Name	Month	Year	Type	East	North
CCP01	Humes Bore	October	2013	Trough	432492.0	7556974.0
CCP02	10 Mile Bore	October	2013	Dam	423338.0	7575930.0
CCP03	Bygana Trough 3	October	2013	Trough	439097.0	7546320.7
CCP04	Labona Bore	October	2013	Trough	433685.0	7565430.0
CCP05	10 Mile No1 Dam	October	2013	Dam	431097.0	7568215.0
CCP06	10 Mile Tank	October	2013	Dam	428718.0	7577918.0
CCP08	Number 2 Dam	October	2013	Dam	429082.0	7572104.0
CCP09	10 Mile Bore	October	2013	Dam	423338.0	7575930.0
CCP11	4 Mile Dam	October	2013	Dam	436047.0	7561138.0
CCP12	4 Mile Bore	October	2013	Trough	427210.0	7575210.0
CCP13	Carmichael Bore	October	2013	Trough	436402.0	7551819.0
CCP14	Four Mile Dam Trough	October	2013	Trough	436047.0	7561138.0
CCP15	Bygana Trough 1	October	2013	Trough	439096.2	7546323.6
CCP16	Swamp Tank Dam	October	2013	Dam	437386.0	7556168.0
CCP17	10 Mile No1 Dam	October	2013	Dam	431097.0	7568215.0
CCP18	Bygana Trough 2	October	2013	Trough	441533.8	7547414.4
CCP19	Humes Bore South Trough	October	2013	Trough	432012.0	7559007.0

2.7 Incidental black-throated finch sightings

Where black-throated finch were encountered incidentally, (outside of the standardised survey methods identified above), the accurate location of the sighting was recorded via GPS, including other bird species present and black-throated finch specific data as outlined in Section 2.1. Intersection of these sites with environmental spatial layers via GIS was used to provide supplementary landscape data regarding vegetation type, distance from water and elevation.

2.8 Habitat assessment

At each 2 ha survey site, a habitat assessment was undertaken using methods based broadly on the Queensland BioCondition framework (Eyre*, et al.* 2011) and the Queensland Herbarium flora survey methods (Neldner*, et al.* 2005), recognising that floristic data can only be collected in the wet seasons when annual species are present and grasses are flowering. For surveys in

May and August 2013, a 100 m transect was set centrally in the 67 x 2 ha sites (52 sites in May and 15 sites in August) and marked at the 0 – 100 m points by a star picket. Each transect was set on a cardinal bearing to assist with relocation over time, and a site photo was taken as a reference. Four habitat components were measured and described during the May and August 2013 surveys (GHD 2013b, GHd 2013d). To reiterate briefly, four general habitat and floristic factors were assessed:

1. Broad management effects – Wildfire, Grazing, Weeds and Erosion.
2. Ground cover – Within 5 x 1 m^2 plots located at the 0, 25, 50, 75, 100 m mark.
3. Ground composition – Within 5 x 1 m^2 plots located at the 0, 25, 50, 75, 100 m mark.
4. Tree and shrub canopy cover (estimate and 100 m line intercept).

2.9 Relational database

All data collected was stored in a relational database (Microsoft Access) for efficient storage and interrogation, so that subsequent survey data could be included and extracted efficiently. This database comprises all existing black-throated finch records from the Study Area from all previous surveys (GHD 2011;GHD 2013c) and (EHP, 2012, unpublished data), and black-throated finch specific surveys conducted in 2012 and 2013 (GHD 2012;GHD 2013b, GHD 2013d).

2.10 Inspection of possible offset areas

In addition to the second ongoing monitoring survey, preliminary assessments were undertaken on two adjacent properties, located to the south-west of EPBC 1690 (Moray Downs and Doongmabulla). Both properties are among a number of locations that have been identified as possible future offset areas. The intention of the surveys was to:

- Confirm the presence of black-throated finch (southern) (*Poephila cincta cincta*) within potential offset locations and/or
- Provide preliminary information to inform the process of selecting appropriate offset areas and establishing suitable locations for ongoing monitoring sites

A half day scout of potential offsets areas within Moray Downs was undertaken by two ecologists on 27th October 2013. This included the establishment of 4 x 2 ha woodland survey monitoring locations, which could potentially be included in future ongoing monitoring events. A single 20 minute bird survey was undertaken at each of these sites to provide a preliminary assessment of the avian diversity in these locations. In addition, 2 remote cameras were deployed at waterbodies within Moray Downs.

A full day scout was undertaken on Doongmabulla by four ecologists on 28th October 2013. This included establishing 10 x 2 ha ongoing monitoring locations, to potentially be included in future ongoing monitoring events. A single 20 minute bird survey was undertaken at each of these sites to give a preliminary assessment of the avian diversity in these locations. In addition, 10 remote cameras were deployed at waterbodies including springs, troughs and farm dams within Doognmabulla.

On both properties, the sites targeted represented locations where potentially suitable habitat for the black-throated finch (southern) was readily accessible by vehicle.

Results obtained from these preliminary observations have not been incorporated in this report. However, they will be used to inform decisions regarding the location and suitability of future offset areas for the black-throated finch (southern). It is envisaged that information from these locations will be incorporated in the establishment of a more extensive network of ongoing monitoring sites across the potential offset locations. This network will be similar to similar to the network of monitoring locations that has been established across the mine site.

3. Results

3.1 Bird surveys

During the current survey, a total of 91 bird species representing 39 families were recorded; 80 from the 2 ha counts and 63 species from the water body counts. This compares to the May 2013 survey, when a total of 117 bird species were recorded from 45 families and the August survey, when a total of 59 bird species were recorded from 24 families. The main difference between the current survey and the May 2013 survey was the lower number of waterbirds (e.g. Anatidae, Podicipedidae, Threskiornithidae, Rallidae, Ciconiidae) and raptors (e.g. Accipitridae, Falconidae) due to the dry conditions.

During the current survey, the most abundant species recorded from the 2 ha counts were the budgerigar *Melopsittacus undulatus* (n=438), zebra finch *Taeniopygia guttata* (n=324), rufous whistler *Pachycephala rufiventris* (n=295), weebill *Smicrornis brevirostris* (n=199), red-backed fairy-wren *Malurus melanocephalus* (n=192), jacky winter *Microeca fascinans* (n=180), singing honeyeater *Lichenostomus virescens* (n=165), little friarbird *Philemon citreogularis* (n=131), Torresian crow *Corvus orru* (n=113) and double-barred finch *Taeniopygia bichenovii* (n=102). In the May 2013 survey, the budgerigar, weebill, red-backed fairy-wren and rufous whistler were all also very abundant. In May 2013 the black-throated finch was the sixth most abundant species recorded. In the current (October 2013) survey, it was only the 56th most abundant species in the 2 ha counts with only six individuals recorded (Appendix C). No black-throated finch were recorded in the 2 ha counts during surveys in August 2013.

During the current survey, the most abundant species recorded from the water body counts were the budgerigar (n=322), double-barred finch (n=113), zebra finch (n=102), pale-headed rosella *Platycercus adscitus* (n=87), Torresian crow (n=52), apostlebird *Struthidea cinerea* (n=43) and black-throated finch (n=34); making the black-throated finch the sixth most abundant species observed during water body counts (Appendix C). In May 2013, only one black-throated finch was recorded at water source counts. In August 2013, 31 black-throated finches were recorded during water source counts; 30 were recorded drinking at a trough at Carmichael bore, south of the Carmichael River and a single adult was observed drinking at a small water body in the southern extent of the Study Area. Most of the birds that were abundant at the water sources during the current survey were granivorous birds that require daily water to drink, whereas during the May 2013 survey, the avifauna was dominated by both granivorous birds and water birds.

In terms of effort, a total of 67 x 2 ha bird counts (n=134 counts) were conducted twice by two ecologists during the current survey. In addition two vehicles were traversing the property and tracks for 8 days of survey and were vigilant for any incidental black-throated finch records. The water body counts comprised of 29.8 hours of watching (Table 3-2).

3.2 Black-throated finch records

During the current survey, a total of 84 black-throated finches were recorded from all surveys methods; six from three different 2 ha counts; 34 from two water body counts; 28 from cameras at dams and troughs (Plate 1) and 16 from two incidental records (Table 3-1). All were adult birds and the most commonly observed activity was drinking (n=6 observations). The largest group observed comprised at least 31 individuals at 10 Mile Bore. This is substantially smaller

than the flocks observed in May 2013, when a total of 208 individual black-throated finches were recorded in observational surveys. During surveys in May 2013, a total of 89 photos were recorded from six cameras (flocks of 1-41 birds), with most birds being recorded from the 2-ha counts. The most common activity recorded via cameras was perching and feeding and the largest group observed were at least 30 individuals feeding in *Eucalyptus melanophloia* woodland and a flock of 41 at an ephemeral water point, recorded on a camera. A total of 31 black-throated finches were recorded during surveys in August 2013 during water body counts.

Plate 1 Camera trap at 10 Mile Bore - flock of approximately 12 black-throated finches drinking (October 2013)

Table 3-1 All black-throated finch (southern) records from the second monitoring event within the study area

Site	Type2	Date	East	North	Adult	Feed	Drink	Perch	Preen	Beg	Fight	Nest	Mate
Incidental	Incidental	25/10/2013	423267.2	7575233.9	15		Yes						
CHAB06	2ha	25/10/2013	422324.8	7575722.9	1		Yes						
Incidental	Incidental	28/10/2013	423767.7	7556806.0	1								
10 Mile No1 Dam	Water	21/10/2013	431186.4	7568219.3	3	Yes	Yes						
CHAB04	2ha	22/10/2013	424738.1	7571955.4	2		Yes						
CHAB20	2ha	22/10/2013	425217.5	7576417.7	3		Yes						
10 Mile Bore	Water	22/10/2013	423382.0	7575879.0	31		Yes	Yes					
Swamp Tank Dam	Camera	21/10/2013	437386.0	7556168.0	1								
Bygana Trough 1	Camera	21/10/2013	439096.2	7546323.6	3								
Bygana Trough 2	Camera	21/10/2013	441533.8	7547414.4	4								
10 Mile No1 Dam	Camera	21/10/2013	431186.4	7568219.3	8								
10 Mile Bore	Camera	21/10/2013	423382.0	7575879.0	12								

Table 3-2 Survey effort (hours) for each of the water body counts within the study area

Water body	Date	Dam	Pools	Trough	Total
August 2013 survey					
Carmichael Bore	21/08/2013			2	2
Carmichael River	22/08/2013		1.5		1.5
Gidgea Dam	22/08/2013	0.5			0.5
Trough 3 South Of Bygana	20/08/2013			1.5	
October 2013 survey					
10 Mile (No. 1) Dam	21/10/2013	3			
10 Mile (No. 1) Dam	22/10/2013	1			
10 Mile (No. 1) Dam	25/10/2013	1			5
10 Mile Bore	21/10/2013	1.5			
10 Mile Bore	22/10/2013	4			5.5
10 Mile Tank	21/10/2013	1			
10 Mile Tank	25/10/2013	1			2
4 Mile Bore	21/10/2013			1	1
4 Mile Dam	21/10/2013	0.6			0.6
4 Mile Dam Trough	21/10/2013			1	1
Humes Bore	21/10/2013			0.3	0.3
Humes Bore	23/10/2013			1	1
Labona Bore	21/10/2013			0.3	0.3
Mathesons Dam	23/10/2013	1			
Mathesons Dam	26/10/2013	2			3
Number 2 Dam	21/10/2013	1.5			1.5
Rocky Dam	22/10/2013	1			1
Swamp Tank Dam	21/10/2013	0.6			0.6
Trough 1 South Of Bygana	21/10/2013			0.3	0.3

Water body	Date	Dam	Pools	Trough	Total
Trough 2 South Of Bygana	21/10/2013			0.6	0.6
Trough 3 South Of Bygana	21/10/2013			0.3	1.8
Trough South Of Humes Bore	21/10/2013			0.3	0.3
Total Effort (August and October surveys)		**19.7 hours**	**1.5 hours**	**8.6 hours**	**29.8 hours**

Table 3-3 Details for camera trapping results within the study area

Site	Date set	Date closed	Days	Total pics	Day pics	Night pics	Fauna pics	BTF pics	BTF total	BTF days	BTF max
CCAM01	21/10/2013	24/10/2013	4	3274	2812	462	92	0	0	0	0
CCAM02	21/10/2013	26/10/2013	6	1707	939	768	100	0	0	0	0
CCAM03	21/10/2013	26/10/2013	6	2596	1827	769	92	0	0	0	0
CCAM04	21/10/2013	25/10/2013	5	2767	2410	357	71	0	0	0	0
CCAM05	21/10/2013	27/10/2013	7	1,438	1348	90	107	0	0	0	0
CCAM08	21/10/2013	26/10/2013	6	3	3	0	0	0	0	0	0
CCAM09	21/10/2013	27/10/2013	7	1720	1003	717	150	8	28	3	12
CCAM10	21/10/2013	27/10/2013	7	717	662	55	14	0	0	0	0
CCAM12	21/10/2013	27/10/2013	7	5170	4252	918	243	0	0	0	0
CCAM14	21/10/2013	26/10/2013	6	4587	3063	1524	268	0	0	0	0
CCAM15	21/10/2013	26/10/2013	6	2,784	2150	634	198	2	3	1	3
CCAM16	21/10/2013	26/10/2013	6	645	615	30	97	1	1	1	1
CCAM17	21/10/2013	26/10/2013	6	622	553	69	44	3	9	1	8
CCAM18	21/10/2013	26/10/2013	6	1832	1185	647	166	2	4	1	4
CCAM19	21/10/2013	25/10/2013	5	1828	1355	473	284	0	0	0	0

BTF = black-throated finch

Please note that remote cameras were not deployed for surveys in August 2013.

3.3 Mixed flocks

In the May 2013 surveys, birds operating in mixed flocks were observed on 26 occasions over the 104 x 2 ha counts and 29.5 hours of water body counts, and comprised a significant component of the avifauna. Black-throated finches were recorded in four of these mixed flocks, associated with budgerigar, jacky winter, black-faced woodswallow *Artamus cinereus* and double-barred finch *Taeniopygia bichenovii*.

In the current survey only nine mixed flocks were recorded, and none contained black-throated finches (refer Table 3-4). The flock size ranged from 2 – 6 species (compared to 2 – 13 in May) and from 7 – 45 individuals (2 – 122 in May). The most common species within mixed flocks were red-backed fairy-wren, weebill, willie wagtail *Rhipidura leucophrys* and zebra finch *Taeniopygia guttata* none of which were common or dominant elements of the mixed flocks in May 2013. During surveys in August 2013, 6 mixed flocks were recorded, but none of these contained black-throated finch. The most common species observed in mixed flocks during surveys in August 2013 included double-barred finch, jacky winter and little woodswallow *Artamus minor*.

Table 3-4 Bird species and abundances recorded in each mixed flock (October 2013) within the study area

Scientific name	Common name	MF28	MF 29	MF 30	MF 31	MF 32	MF 33	MF 34	MF 35	MF 36
Climacteris picumnus	brown treecreeper		1							2
Malurus melanocephalus	red-backed fairy-wren	6	5	6	6	3	2			
Smicrornis brevirostris	weebill		3	3	2	1	3			2
Gerygone albogularis	white-throated gerygone						2			
Acanthiza chrysorrhoa	yellow-rumped thornbill		1						2	2
Melithreptus albogularis	white-throated honeyeater						2			
Microeca fascinans	jacky winter							2	4	
Daphoenositta chrysoptera	varied sitella		8					4		
Pachycephala rufiventris	rufous whistler								7	1
Rhipidura leucophrys	willie wagtail		1	3		1		1	2	
Taeniopygia guttata	zebra finch	10		2	8	25				
Taeniopygia bichenovii	double-barred finch					10				
Neochmia modesta	plum-headed finch					5				
Dicaeum hirundinaceum	mistletoebird				1					

3.4 Variation in black-throated finch sightings and abundance May and October

For the purpose of comparing seasonal variations during survey events only data collected during May and October have been included. Survey results from August have been excluded from this comparison due to the limited number of survey sites seasonality.

Between the two on-site monitoring surveys in May and October 2013, there was insufficient standardised records (i.e. 2 ha and water counts) to undertake more formal multivariate or univariate analysis of differences in species or composition of the avifauna in the black-throated finch present or absent sites. However, broad patterns of differences in the number of sightings and abundance were examined between survey methods and water body types. The results showed that:

- The total number of sightings (separate location were black-throated finches were found) declined from May to October for the 2 ha and incidental observations, increased (albeit from one to two) for the water source counts, and declined slightly for the camera traps (Graph 3-1);
- Similar to the above, the total black-throated finch abundance declined dramatically for the 2 ha counts and incidental records, increased for the water sources, but declined for the camera results (Graph 3-2);
- The variation in sightings for each of the water sources (counts, cameras and incidental records combined) indicated that more sightings were at dams in October but more were at troughs and ephemeral sources in May (Graph 3-3); and
- The variation in abundance followed a similar pattern to the above, where black-throated finch abundance was higher at troughs and ephemeral water in May and higher at dams in October (Graph 3-4).

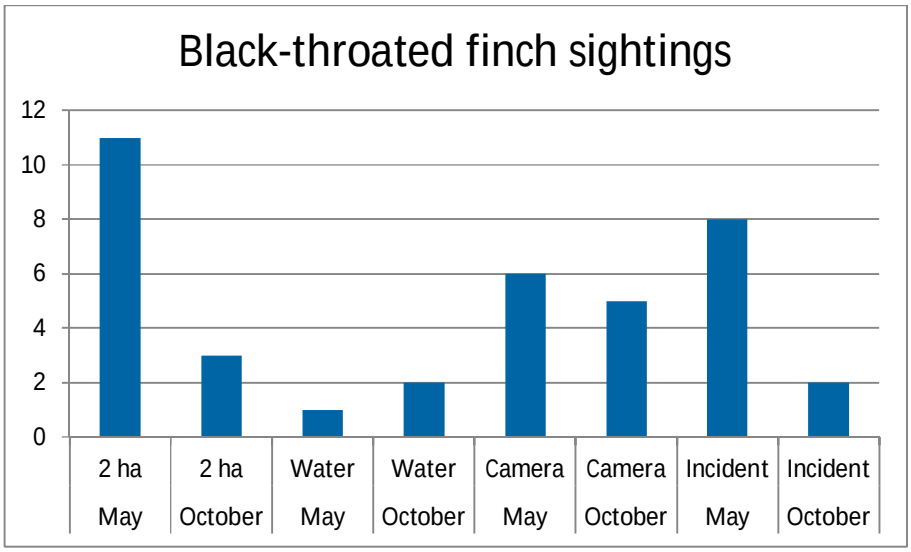
Figure 3-5 provides a summary of locations where black-throated finch have been recorded from 2011-2013. The pie chart in Figure 3-5 is scaled to total abundance and separated to indicate the proportion of records for each year.

3.5 Variation in vegetation structure May to October

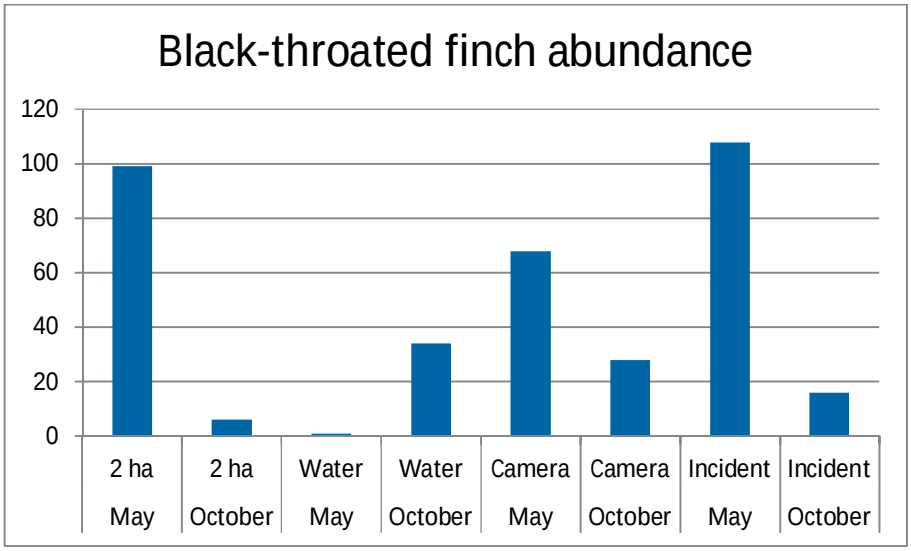
As floristic data was not collected during October 2013 surveys due to the dry season conditions (i.e. lack of annual species and flowering material for identification of grasses), and there were insufficient standardised records to compare black-throated finch present or absent sites, instead, variation in ground cover was compared between remnant and non-remnant vegetation types for the 2 ha sites. The results showed that:

- For non-remnant vegetation, native tussock cover and non-native grass cover declined significantly from May to October and bare ground and litter increased (Graph 3-6); and
- For remnant vegetation the change was similar, though non-native grass cover was low in both seasons, and the increase in bare ground cover was substantial (Graph 3-7).

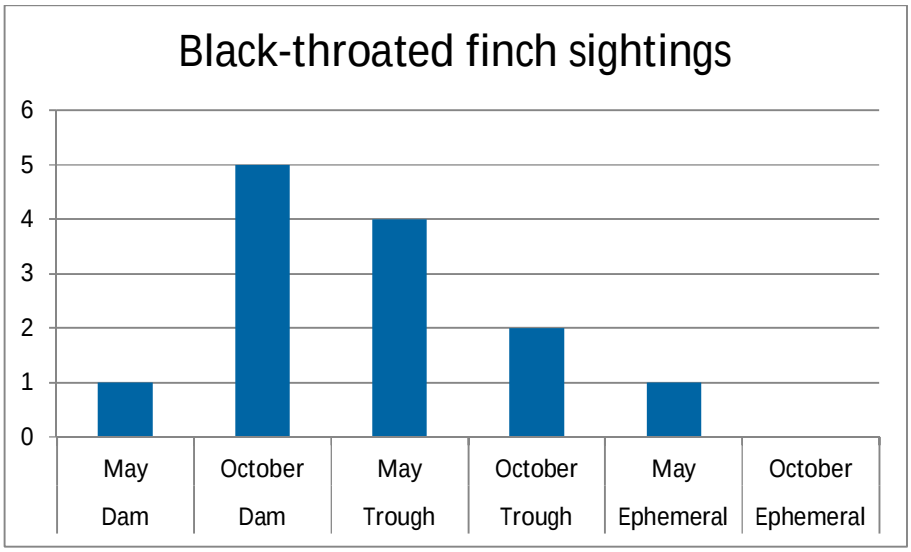
Graph 3-1 Variation in total number of locations of black-throated finch sightings for each method, May and October 2013



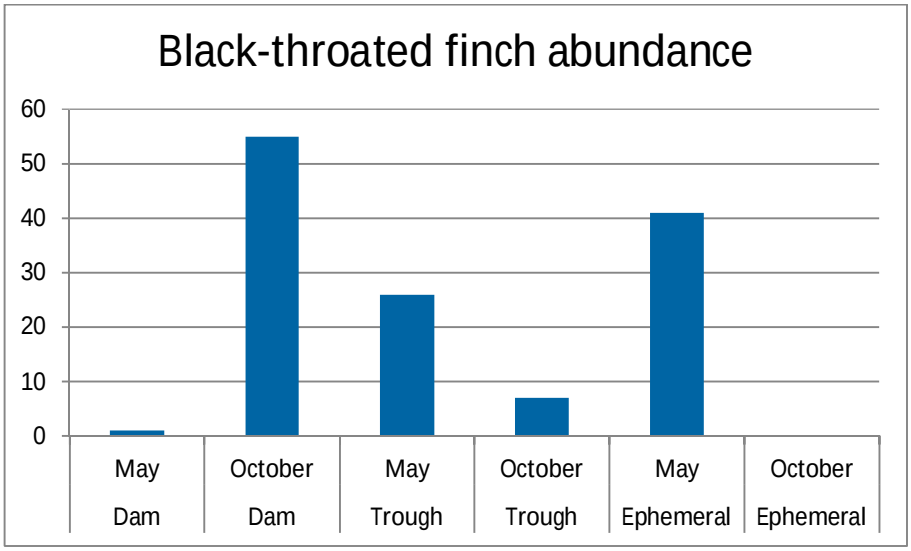
Graph 3-2 Variation in total abundance of black-throated finch for each method, May and October 2013

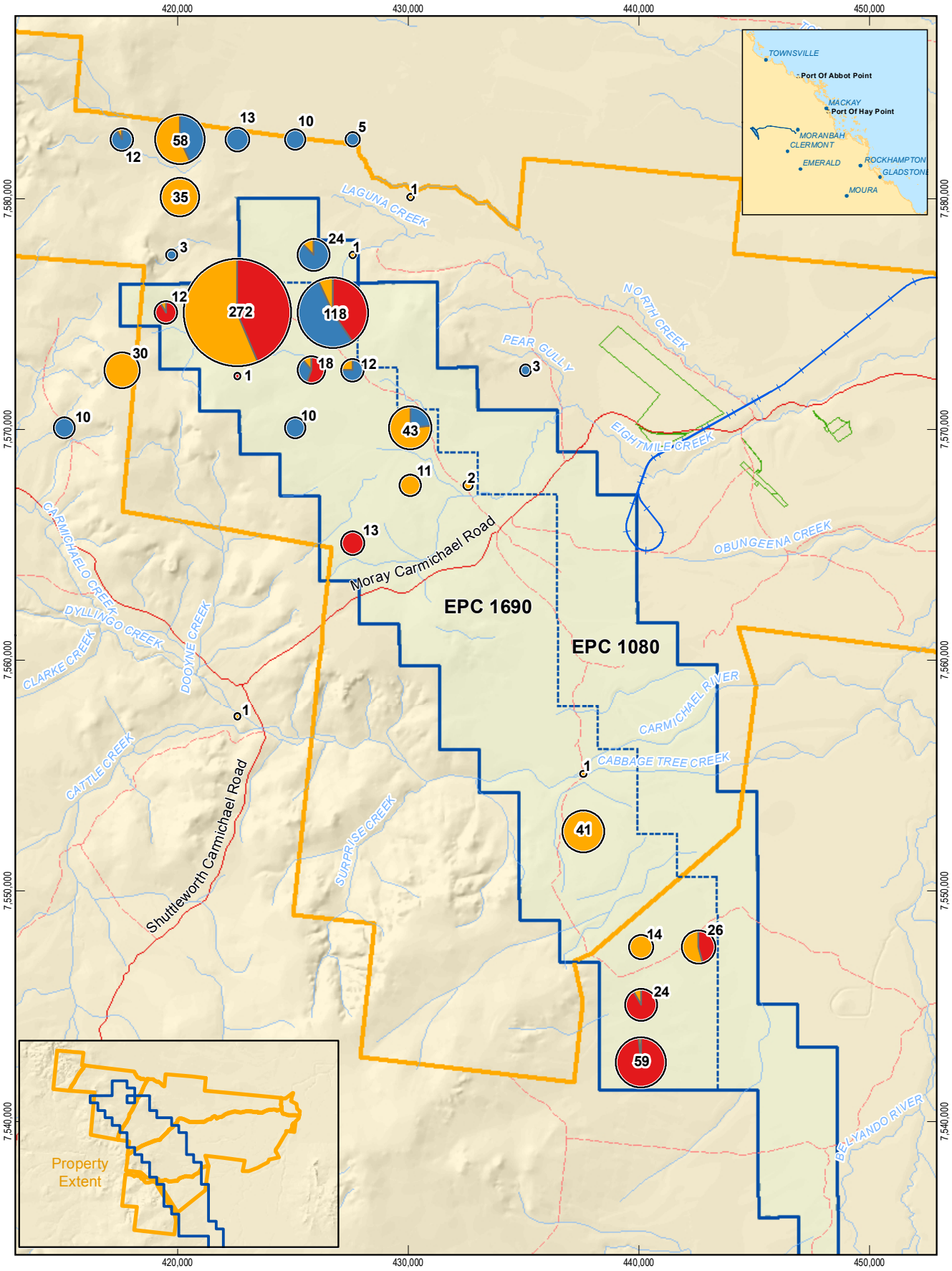


Graph 3-3 Variation in total number of locations of black-throated finch sightings at different water source types, May and October 2013



Graph 3-4 Variation in total abundance of black-throated finch at different water source types, May and October 2013





LEGEND

BTF Aggregated Locations

- BTF abundance 2011
- BTF abundance 2012
- BTF abundance 2013

- Watercourse
- Waterbody
- Minor Road
- Track

- Project (Mine)
- Mine (Offsite)
- Project (Rail)
- Moray Downs Property

1:235,000 (at A4)

0 2 4 6 8 10

Kilometres

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

N

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS

Job Number 41-26422
Revision C
Date 28-02-2014

Summary of locations where black-throated finch have been recorded from 2011-2013

Figure 3-5

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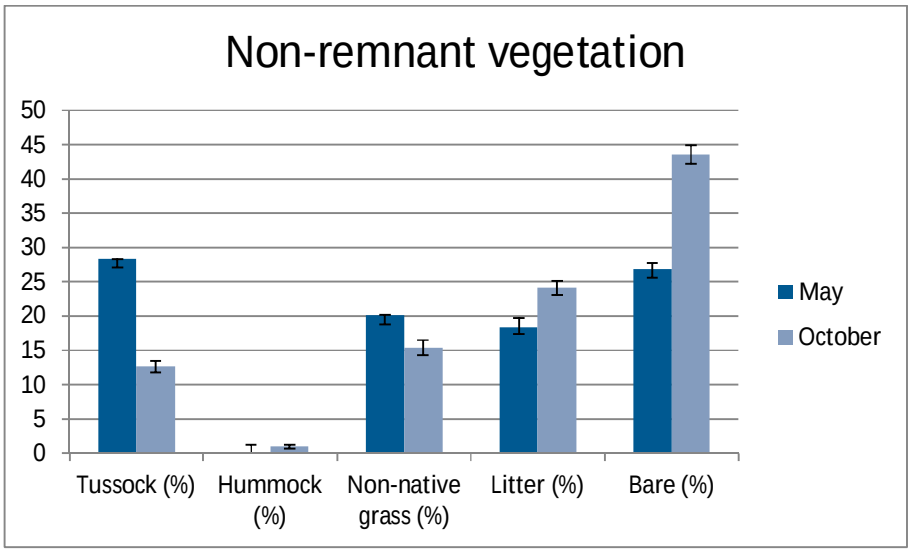
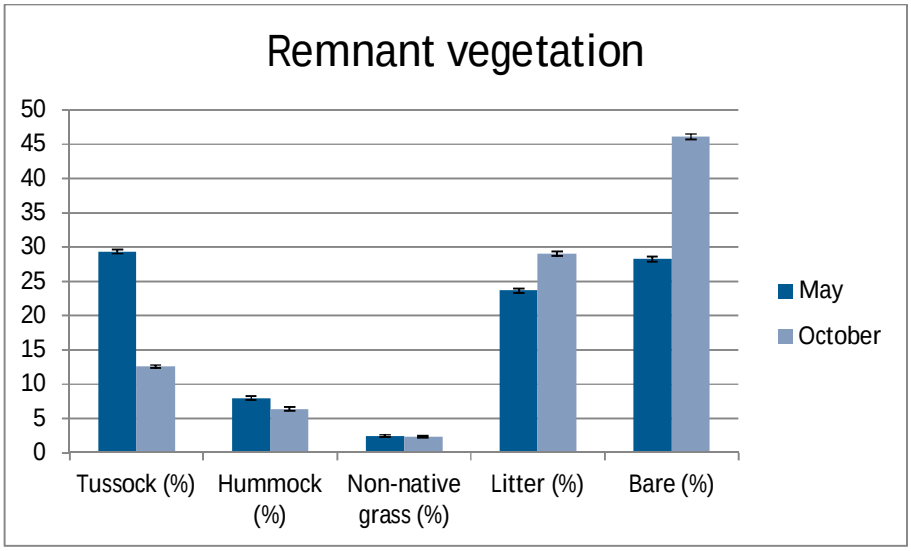
Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: GA: Road, Watercourse (2007); DME:EPC1690 (2010), EPC1080 (2011); DNRM: Waterbody (2010); GHD: Property, BTF Abundance (2013) Adani: Offsite Infrastructure, Alignment(2013).

Graph 3-6 Mean (and SE) cover of major ground cover variables in non-remnant vegetation, May and October 2013



Graph 3-7 Mean (and SE) cover of major ground cover variables in remnant vegetation, May and October 2013



3.6 Inspection of future possible offset areas

The black-throated finch was confirmed present during preliminary assessments undertaken at the potential offset locations. The black-throated finch was recorded at three locations on Doongmabulla property. These are shown in Figure 1-1. A remote camera image from the sighting location is shown in Plate 2. Additionally, squatter pigeon was recorded in one location. No black-throated finch (southern) was recorded during scouting on Moray Downs.

Although comprehensive vegetation assessments were not undertaken in the preliminary assessments, suitable habitats for the black-throated finch (southern) were identified on the potential offset areas. It is envisaged that the information from this preliminary assessment and the data from the remote cameras will be used to assist the planning and development of future potential offset areas. The sites will be incorporated into a broader and more comprehensive network of long-term monitoring sites that will be established within the offset areas, should these areas be chosen as offset sites. Further detailed development and surveys will be undertaken to broaden understanding the distribution and utilisation of habitat for the black-throated finch(southern) within these possible future offset areas.

Plate 2 Location of black-throated finch sighting on Doongmabulla

4. Discussion

4.1 October 2013 Monitoring

The intent of the monitoring program was to collect further information on the habitat preferences, ecology, temporal and spatial variation in distribution, coarse population estimates and effects of land management for the Study Area and Mine site. This survey is the second of a series of monitoring surveys that are proposed to be undertaken between 2013-2014, prior to the commencement of the construction phase of the Project and in in the following years as defined in the black-throated finch Species Management Plan (GHD 2014). The survey provides the baseline for the proposed long term adaptive monitoring and management of this endangered species over the life of the Project. It has included resampling at existing sites established during the previous monitoring, to provide dry season data as a counterpoint to the May 2013 survey completed at the end of the wet season. This locally relevant data will assist in developing more effective and targeted management and mitigation actions, in concert with the broad recommendations in the Significant Impact Guidelines for the black-throated finch (southern) *Poephila cincta cincta* (DEWHA 2009a;DEWHA 2009b); and the National Recovery Plan for the species (Black-Throated Finch Recovery Team 2007)

Over the three surveys to date, a large number of standardised surveys sites have been established and monitored, including: 67 x 2 ha woodland plots (52 surveyed in May, 15 in August and all 67 in October); 36 individual water body watches (10 in May, 4 in August and 22 in October 2013), representing 59.3 hours of survey; 37 camera traps deployed (20 in May, none in August and 17 in October) providing 737 days of camera survey for a total of 95,615 photos (7,092 fauna photos). In addition, the daily travel to and from survey sites over 2 x 8 day survey periods (May and October 2013) and 1 x 3 day survey (August 2013) provides an important opportunity to record incidental black-throated finch observations. This monitoring represents a substantial effort.

All black-throated finch sightings and abundance have been mapped to date to investigate the general pattern of finch location and abundance over time (Figure 3-5). This has incorporated known sightings from GHD (2011;2012;GHD 2013b;GHD 2013c; GHD 2013d), Ecology and Heritage Partners Pty Ltd (unpublished data, 2012) and the current survey. Locations are mapped as pie charts scaled to the total abundance over time (i.e. the larger the circle the higher the abundance) and split for each year where surveys have occurred. Although it is recognised that the survey effort is variable from 2011 to 2013 and ranged from general to targeted work, this data provides a general sense of the locations in the landscape where the black-throated finches are recorded consistently and in high numbers. The region to the north of the Mine site, Moray Downs (around 10 mile Bore) and the troughs in the south of the Mine site around Bygana (Carmichael Bore, Bygana Bores 1-3) consistently return a large number of records of the black-throated finch, compared to the central locations in the Mine site. This suggests that these are more important locations for the species, and will require retargeted management and mitigation actions once construction of the Mine commences.

A review of these survey results in context of those conducted in May 2013 provides useful information on the species ecology, local distribution, and the survey methods that have been undertaken.

The relative abundance of black-throated finches recorded across the Mine and adjacent areas on Moray Downs, declined in October compared to May. This is a typical seasonal pattern for granivorous birds, when ephemeral water sources and food sources decline. The absolute abundance declined, though anecdotally a few weeks prior to our survey, a student (Stanley Tang) from James Cook University, trapped and banded 50 birds, and located a flock of about 100 birds, at 10 Mile Bore. Prior to his successful trapping, he spent a number of days searching for birds and was unable to locate any (S. Lovelock, Adani, pers. comm.). It was at 10 Mile Bore that the largest flock was observed in the current survey, and a flock of 14 was recorded on one of the camera traps. This suggests that this location remains an important focus for black-throated finch in both the wet and dry seasons. It was near that location the nests were identified, and large flocks were observed feeding in May 2013. In May 2013, finches were recorded more widely across the landscape, and were more frequently observed in the 2 ha woodland sites. Multiple observations of feeding and nesting were recorded. Though finches were found near the water, it is clear that they move in larger flocks around the local landscape, using other water sources, and key feeding sites. No observations of feeding were recorded, and the grasses at the 2 ha survey sites were dry and seedless. It is still uncertain where the black-throated finches feed in the dry season and it would be important to determine. Ongoing monitoring in the dry season (as well as the wet season), will provide a better understanding of seasonal changes in habitat use by the black-throated finch.

From the monitoring surveys to date relatively clear habitat associations have been observed. In the May 2013 survey, consistently high numbers of black-throated finch were recorded in the intact remnant vegetation dominated by *Eucalyptus melanophloia* woodlands (10.5.5) and the associated *E. similis* (10.5.1) and *E. populnea/brownii* woodlands (10.3.6 / 10.3.28). Higher quality habitat in the local landscape seems to occur in the north-west (Moray Downs northern boundary), west (Carmichael boundary) and south-west (Bygana boundary). These areas are notable for the low historical grazing pressure (due to their adjacency to paddocks that contain poison bush (*Gastrolobium grandiflora*) which is toxic to cattle), the general low nutrient status of the soils and low pasture value for cattle, compared to the clay soils that have historically been extensively cleared to the west. The grass diversity in these areas is high and contains a large number of species considered preferred food sources for the black-throated finch (Black-Throated Finch Recovery Team 2007). To further support the contention that good condition, lightly grazed sites seem to provide more suitable habitat, *Eucalyptus melanophloia* woodlands (10.5.5) to the east of the Mine site that were sampled in this monitoring array, have never recorded black-throated finches, despite ample water and the presence of the regional ecosystem that has consistently been recorded to contain high numbers of black-throated finch. These sites are grazed more heavily and are in poorer condition.

The May and October 2013 surveys, have demonstrated how different methods of monitoring have differing success in different seasons. The Significant Impact Guidelines recommend undertaking water body counts, particularly in the dry season when birds come into drink on regular and persistent water sources (DEWHA 2009a). The surveys reported here, supported this, indicating that water body counts and cameras on water sources were more successful than the May survey. However it was clear that the 2 ha bird counts in stratified and semi-random locations that targeted known habitat in good condition, were more successful in the wet season, when the birds are feeding and nesting across the landscape, and smaller ephemeral water sources are spread across the local landscape. Overall this suggests that for long term monitoring across a Study Area that is visited over multiple survey sessions and seasons, a combination of a variety of techniques is essential. In addition the camera trapping

has provided a valuable and cost effective additional method for recording black-throated finches. This method also provides valuable secondary information on other species such as feral animals (pigs *Sus scrofa* and cats *Felis catus*), which can be incorporated into the broader pest management strategy for the Project.

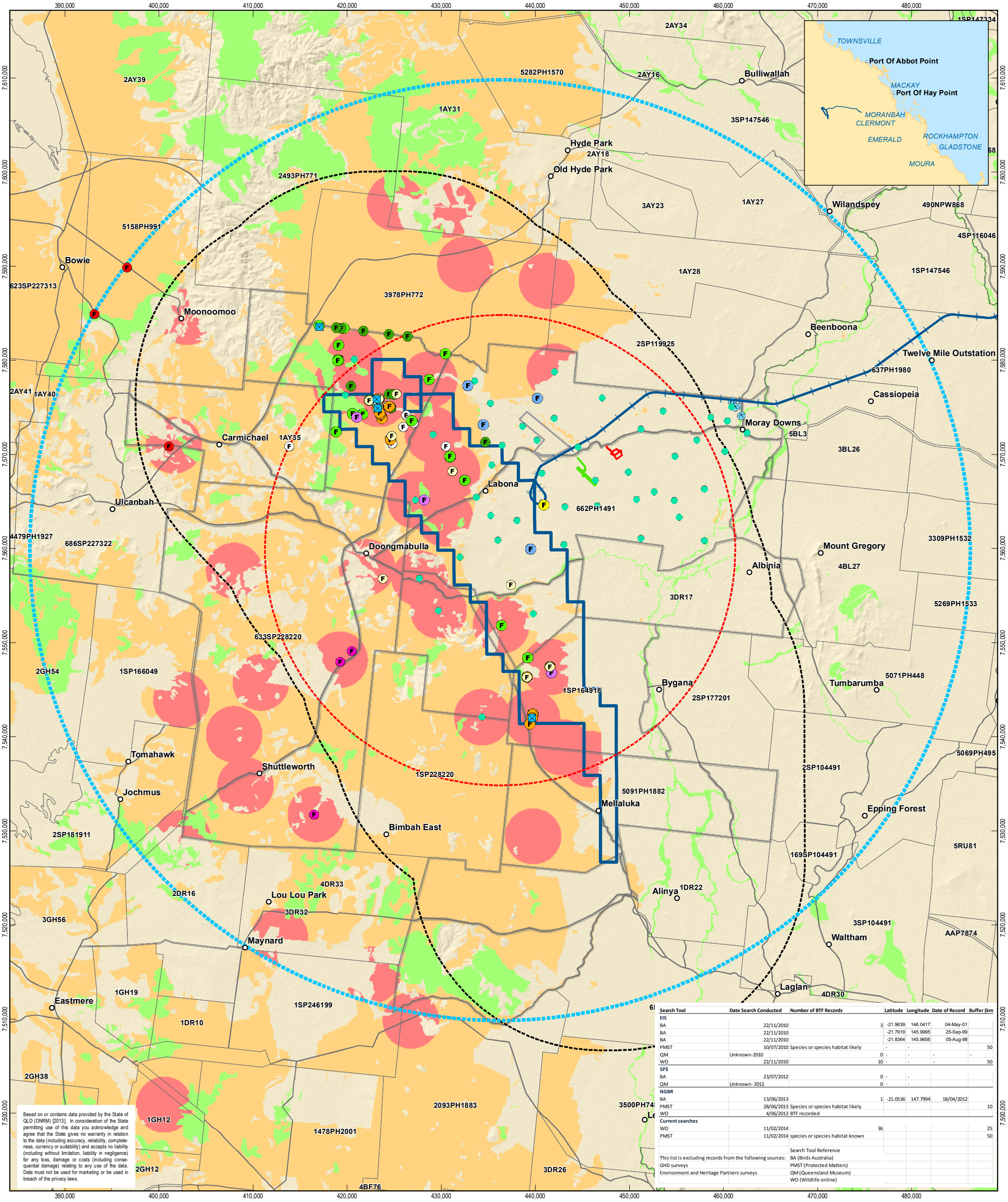
The general composition of the woodland bird community recorded in the current survey was similar to that recorded in the May survey, with only a few seasonal migratory species of difference between the surveys (e.g. channel-billed cuckoo, pallid cuckoo, shining bronze-cuckoo, pheasant coucal). There were a couple of unusual records, at the northern and eastern edge of their natural range; crested shrike-tit and yellow-tailed black-cockatoo. As noted earlier there was also a substantial decline in waterbird and raptor species related to the decrease in water across the landscape and in the water sources. There were notably less mixed flocks, and this is probably a consequence of the lower abundance of seeding grasses. Mixed feeding flocks are a typical component of the avifauna of the tropical savannas of northern and central Queensland (Vanderduys*, et al.* 2012), and the ecological and functional role of these mixed flocks is mainly via predator vigilance and avoidance while feeding, and cooperative feeding (i.e. ground feeding birds flush insects that hawking feeders eat). During the current survey, the mixed flocks were smaller and dominated by insectivorous and hawking species, whereas in May, there were more substantial and numerous mixed flocks associated with ground feeding granivores, a direct consequence of the higher availability of food resources. As habitat disturbance can disrupt mixed flocks and this can have a cascading effect on some woodland bird species, due to the loss of predator vigilance when feeding (Garnett*, et al.* 2011), management of grazing and fire in offset or remaining black-throated finch habitat will be important to maintain habitat condition.

Finally the ground cover changes from the May (wet season) to October (dry season) surveys clearly indicate that the reduced number of black-throated finches and the lower abundance and species richness of the woodland bird community in general, has some association with the decline in tussock grass cover (and increased bare ground and litter cover) and the food provided gramineous and annual forb species. Species recorded as food sources such as *Triodia pungens* were not seeding, and others annual species *Panicum effusum Enteropogon ramosus*, *Paspalidium rara*, *Schizachyrium fragile* and *Digitaria brownii* (food, nesting material) had simply died and become litter. It is likely that there are key locations where perennial tussock and annual grasses that have larger and persistent seeds that remain on the ground through the dry season (*Triodia, Themeda, Sarga*). These would provide key dry season food resources.

4.2 Black-throated finch habitat value mapping

As part of the Carmichael Coal Mine and Rail SEIS, a mapping process was undertaken where habitat within the study area was classified as (currently) high value habitat (permanent water or otherwise) or low value habitat. Refer to the Carmichael Coal Mine and Rail SEIS for details of the habitat value mapping methods.

Refer to Figure 4-1 for the black-throated finch (southern) habitat value mapping updated with all black-throated finch sightings recorded to date (including October 2013 monitoring).



Based on or contains data provided by the State of QLD (DNRM) [2013]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

Search Tool	Date Search Conducted	Number of BTF Records	Latitude	Longitude	Date of Record	Buffer (km
EIS						
BA	22/11/2010	3	-21.9639	146.0417	04-May-01	
BA	22/11/2010		-21.7919	145.9995	25-Sep-99	
BA	22/11/2010		-21.8364	145.9656	05-Aug-98	
PMST	10/07/2010	Species or species habitat likely	-	-		50
QM	Unknown-2010	0	-	-	-	-
WO	22/11/2010	10	-	-	-	50
SP3						
BA	23/07/2012	0	-	-		
QM	Unknown- 2012	0	-	-		
NGBR						
BA	13/06/2013	1	-21.0536	147.7994	18/04/2012	
PMST	28/06/2013	Species or species habitat likely				10
WO	4/06/2013	BTF recorded				
Current searches						
WO	11/02/2014	36				25
PMST	11/02/2014	species or species habitat known				50

	Search Tool Reference
This list is excluding records from the following sources:	BA (Birds Australia)
GHD surveys	PMST (Protected Matters)
Environment and Heritage Partners surveys	QM (Queensland Museum)
	WO (Wildlife online)

LEGEND

- Homestead
- Database - Birds Australia - Summer 2010
- Survey - Summer 2013 (SEIS Offsets)
- Survey -Waterbodies (EIS 2011,2012)
- Surveys Winter 2013 (SEIS Ecology)
- Survey Autumn 2011 (EIS 1690)
- Survey Spring 2011 (EIS 1080)
- Survey Spring 2011 (EIS 1690)
- Survey Autumn 2012 (Targeted BTF)
- Survey Autumn 2013 (Offsite Infrastructure)
- Survey Autumn 2013 (Targeted BTF)
- Surveys - Winter 2012 (Ecology and Heritage Partners)
- Indicative Dams (Adani)
- Project (Rail)
- 25km Buffer (Mine centre)
- 50km Buffer (Mine centre)

Mine (Offsite)

- Pump Station
- Storage Facility (Offstream)
- Airport
- Industrial Area
- Accommodation Village
- Project (Mine) 20km Buffer
- Project (Mine)
- Property Boundary
- Property Boundary (Intersected EPC)
- High Value Habitat (Permanent water)
- High Value Habitat
- Low Value Habitat

1:375,000 Paper Size A3

0 5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project SEIS

Black-throated finch (southern) habitat value mapping updated with sightings from the October 2013 monitoring

Job Number	41-26422
Revision	A
Date	27 Feb 2014

Figure 4-1

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145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: DME: EPC 1690 (2010), EPC 1080 (2011); DNRM: Regional Ecosystems v6.0, v6.1 (2010/2011); © Copyright Commonwealth of Australia - Geoscience Australia: Mainland, Homestead, Locality, Road, Watercourse (2007); Adani:Project Rail 1 (Opt11 Rev2) & 2 (Opt9 Rev3), Facilities, Offsite, Mine (Onsite) (2013); GHD:Sightings, Potential Habitat (2011/12), Value Habitat, Confirmed Sightings, Surveys (2013/Various); ESRI: Hillshade (2008). Created by: MS

4.3 Implications of reconnaissance of the Doongmabulla Station

Initial reconnaissance of the Doongmabulla Station will inform future monitoring and the decisions regarding the selection of possible offset areas. Similar habitats to those observed on the Mine site were observed, including small, clear water bodies, adjacent to large paddocks that are lightly or not grazed due to the presence of poison bush and poor nutrient soils. Black-throated finches were also confirmed present. A comprehensive monitoring strategy, consistent with that initiated on the Mine site is required to confirm the ecological suitability of the area as a possible future offset for the black-throated finch. Doongmabulla Station will be incorporated in the ongoing monitoring and management strategies for the Project and broaden the understanding of the local distribution and use of habitats by the black-throated finch.

4.4 Implications for Black-throated Finch Species Management Plan

The monitoring surveys conducted in May, August and October 2013 provide important long term data and local scale information that can be included in the black-throated finch management plan for the Mine and any offset properties. Though this information will be expanded in any future management plan, to present clear, measurable mitigation and management actions, performance indicators and reporting and compliance, key data for the plan are:

1. Black-throated finches in the Mine site consistently use the same water sources, and these water sources are more commonly both small dams that are fenced from cattle access, and troughs. These water sources are clean, and not pugged or degraded due to cattle access. This suggests that the provision of water sources, both to maintain persistence in the landscape in areas that will not be cleared and to encourage finches to access and utilise offset or adjacent areas that contain habitat but have less regular water sources (e.g. areas in Moray Downs directly north of the Mine site), need to be smaller in size, include troughs and be protected from cattle access. Troughs should be raised to prevent access by cattle and feral animals (based in models used in Newhaven and Gluepot Reserves) and small dams could be contained within both cattle and feral animal proof fences. The location of regular finch records and water sources are relatively well known, and planning should commence to identify and construct new water sources to facilitate regular black-throated finch use.

2. Although it has been suggested that black-throated finches have some capacity to tolerate cattle grazing (DEWHA 2009a), this information is based on research in the Townsville region; an area that is developed, peri-urban and disturbed. The evidence from the monitoring conducted on the Mine site from 2011, and including the more detailed monitoring suggests that the best habitat is in fact that which has had an absence of grazing. The better utilised artificial water sources are directly adjacent to larger paddocks that are lightly or not grazed. Therefore the development of clear management actions with respect to grazing will be important. As lands identified within the management plan are likely to continue to be grazed, there will need to be clear management actions with respect to wet season spelling, rotating stock and keeping paddocks already free from grazing in the same state, to achieve the desired outcomes of the plan. Many sustainable grazing land management recommendations with respect to stocking rates for particular land types and spelling of country will be compatible with

finch management. Others, such as the use of exotic pasture species, are not. There is no evidence that black-throated finches are utilising introduced pasture species in the Study Area, despite some suggestion of data from the Townsville region that the species uses introduced *Urochloa* and *Bothriochloa* grasses (DEWHA 2009a). Weed management actions that also address the control and removal of exotic pasture species will be required.

3. The dry season is a critical period when water and food resources are at their nadir. This is also a critical period for wildfire. Large bushfires in the late dry season that remove the best quality habitat, potentially disrupt nesting and destroy essential fallen seed resources may have catastrophic impacts on the species. The risk of a significant effect will increase over time, as habitat is removed through the proposed development of a number of mines across the Galilee Basin. Therefore fire management plans and actions that relate to prevention of later dry season wildfire are important and these will be coincident with fire plans that seek to protect people and property on the Mine site. Key actions will be to develop clearly maintained fire breaks around key black-throated finch habitat (feeding and nesting areas), and undertake late wet season mosaic burns to create natural fuel patchiness in the landscape. This will have a secondary benefit in maintaining grass diversity and heterogeneity.

4. Though the offset areas for black-throated finch are still being finalised, species management plans and actions for the Mine site will also need to be considered where applicable for these areas. Actions should be developed that address landscape scale management of the species across multiple properties, and this would include monitoring. Therefore careful and collaborative management planning needs to be undertaken by Adani together with offset property managers, recognising that the primary purpose of offsets will be to protect habitat for protected species including the black-throated finch.

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Appendices

Appendix A – Location of 2 ha survey sites and their landscape characteristics

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB01	E	EPC	427319.5	7564911.5	10.5.1d	277.7	527.4	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB02	S	EPC	426469.6	7567541.3	10.5.5a	279.4	334.9	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB03	E	EPC	425249.2	7570166.2	10.5.1d	285.0	1966.1	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB04	S	EPC	424738.1	7571955.4	10.5.5a	283.4	1309.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB05	W	EPC	423618.1	7573979.8	10.3.28a	288.0	436.8	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB06	S	EPC	422324.8	7575722.9	10.5.5a	298.5	1326.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB07	N	Moray	419923.4	7577402.6	10.5.5a	324.1	179.4	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB08	E	Moray	418803.7	7572371.1	10.5.5a	317.2	1260.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB09	W	EPC	420566.8	7574366.6	10.5.5a	304.3	177.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB10	E	EPC	419077.5	7575395.6	10.5.1a	328.5	993.4	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB11	S	Moray	419079.0	7580025.9	10.7.11a	318.9	1409.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB12	S	Moray	417749.8	7580444.7	10.5.1a	319.8	1643.5	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB13	W	Moray	416092.8	7579010.5	10.5.5a	363.3	1861.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB14	E	Moray	416121.0	7581590.0	10.7.11a	340.2	848.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB15	W	Moray	414414.1	7583803.6	10.5.10	347.1	47.0	Dry woodlands to open-woodlands, dominated by bloodwoods or ironbarks

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB16	S	Moray	417001.8	7583684.4	10.7.11a	323.5	91.4	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB17	W	Moray	419267.0	7582921.0	10.5.5a	308.2	1152.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB18	S	Moray	420810.0	7583191.0	10.5.5a	295.9	1549.9	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB19	S	Moray	423758.0	7582809.0	10.5.5a	281.0	3042.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB20	N	EPC	425217.5	7576417.7	10.5.5a	276.5	1390.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB21	S	EPC	424594.1	7574981.7	10.3.28a	281.5	1145.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB22	E	EPC	426312.4	7573408.2	10.5.5a	274.7	370.4	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB23	S	EPC	429102.9	7571664.6	10.3.28a	261.6	349.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB24	S	EPC	430891.3	7569686.7	10.3.28a	250.2	7.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB25	S	EPC	432665.1	7567048.8	10.4.5	241.0	97.1	*Acacia cambagei* or *A. georginae* or *A. argyrodendron* open forests
CHAB26	E	EPC	435623.8	7568478.6	Nonrem	237.3	592.3	Non-remnant
CHAB27	E	EPC	434980.3	7570378.9	Nonrem	234.1	655.5	Non-remnant
CHAB28	E	Moray	434480.7	7572373.1	Nonrem	244.2	764.4	Non-remnant
CHAB29	E	Moray	434206.2	7575210.8	Nonrem	246.5	33.3	Non-remnant
CHAB30	W	Moray	434549.0	7578457.5	Nonrem	242.3	229.9	*Eucalyptus populnea* (or *E. brownii*) woodlands
CHAB31	S	Moray	433133.8	7579619.0	Nonrem	248.1	144.5	*Eucalyptus populnea* (or *E. brownii*) woodlands
CHAB32	S	Moray	430444.3	7580697.7	Nonrem	254.5	222.1	*Eucalyptus melanophloia* woodlands to open-woodlands

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB33	W	Moray	428551.6	7579130.3	Nonrem	259.7	283.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB34	N	Moray	431071.0	7578350.0	Nonrem	251.1	18.0	Non-remnant
CHAB35	S	Moray	430826.2	7576903.9	Nonrem	257.4	20.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB36	S	Moray	433547.2	7577171.3	Nonrem	245.6	263.2	Non-remnant
CHAB37	S	EPC	429110.6	7575027.2	Nonrem	291.1	1868.9	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB38	W	EPC	434440.2	7564126.5	Nonrem	235.8	768.2	Non-remnant
CHAB39	N	EPC	436050.0	7561144.2	Nonrem	234.8	2168.8	Non-remnant
CHAB40	E	EPC	436538.8	7559460.8	Nonrem	242.5	1620.9	Non-remnant
CHAB41	N	EPC	436730.3	7556963.4	Nonrem	231.4	588.0	Non-remnant
CHAB42	W	EPC	437362.0	7555139.3	Nonrem	230.2	118.6	Non-remnant
CHAB43	E	EPC	437384.6	7553812.0	Nonrem	237.1	723.6	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB44	E	EPC	435846.2	7551470.6	Nonrem	261.5	719.0	Dry woodlands to open-woodlands, dominated by bloodwoods or ironbarks
CHAB45	S	EPC	438652.2	7552498.1	Nonrem	240.9	1279.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB46	W	EPC	437540.4	7548868.6	Nonrem	261.2	250.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB47	N	EPC	439645.3	7550939.8	Nonrem	241.2	203.2	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB48	N	EPC	440214.6	7549287.8	10.3.28a	243.9	668.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB49	W	EPC	432315.8	7557767.3	Nonrem	250.5	1483.3	Non-remnant
CHAB50	E	EPC	431362.9	7559818.5	10.5.1c	277.1	1455.7	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB51	W	EPC	432916.5	7562441.5	Nonrem	261.6	530.1	Non-remnant

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB52	W	EPC	430734.3	7563922.1	10.3.28a	262.1	275.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB53	S	EPC	438947	7544990	10.3.28a	265.1	389.4	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB54	W	EPC	439627	7542308	10.3.28a	260.9	1944.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB55	S	EPC	442196	7545164	10.3.28a	241.5	3510.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB56	S	EPC	444007	7542454	10.3.28	231.2	3691.8	Non-remnant
CHAB57	S	EPC	441886	7542181	10.5.5a	246.8	4004.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB58	S	EPC	440089	7547404	10.5.7a	246.5	1984.6	Low open woodlands *Grevillea striata*, *Acacia spp*., *Terminalia spp*., or *Cochlospermum spp*
CHAB59	N	EPC	442968	7548647	10.3.28a	226.3	2303.2	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB60	S	EPC	442462	7551172	11.4.6	225.7	522.8	Non-remnant
CHAB61	N	EPC	443185	7553927	10.3.12	226.1	1110.5	Non-remnant
CHAB62	W	EPC	436339	7566602	10.3.28a	239.8	1914.2	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB63	N	EPC	437954	7563090	Nonrem	225.7	187.3	Non-remnant
CHAB64	W	EPC	440046	7560416	Nonrem	226.0	654.1	Non-remnant
CHAB65	W	EPC	439900	7557870	Nonrem	233.0	789.7	Non-remnant
CHAB66	S	EPC	439356	7554543	10.3.6a	228.8	663.2	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB67	S	EPC	440796	7552927	Nonrem	229.0	66.4	Non-remnant

Appendix B – Bird species and abundance for the water body counts

Scientific name	Common name	Dam	Ephemeral	Trough
Dromaius novaehollandiae	emu	5		
Anas superciliosa	Pacific black duck	3		
Anas gracilis	grey teal	6		3
Anhinga novaehollandiae	Australasian darter	1		
Microcarbo melanoleucos	little pied cormorant	1		
Phalacrocorax sulcirostris	little black cormorant	1		
Ardea pacifica	white-necked heron	2		
Haliastur sphenurus	whistling kite	10	1	
Aquila audax	wedge-tailed eagle	1		
Falco berigora	brown falcon			1
Falco cenchroides	nankeen kestrel	1		
Ardeotis australis	Australian bustard	4		4
Elseyornis melanops	black-fronted dotterel	4		
Vanellus miles	masked lapwing	5		2
Phaps chalcoptera	common bronzewing	4		
Ocyphaps lophotes	crested pigeon	8		12
Geopelia cuneata	diamond dove	3		11
Geopelia striata	peaceful dove	9		2
Calyptorhynchus banksii	red-tailed black-cockatoo	7		
Cacatua galerita	sulphur-crested cockatoo	7		
Trichoglossus haematodus	rainbow lorikeet		1	
Aprosmictus erythropterus	red-winged parrot	10		

Scientific name	Common name	Dam	Ephemeral	Trough
Platycercus adscitus	pale-headed rosella	61		26
Melopsittacus undulatus	budgerigar	217		105
Eurystomus orientalis	dollarbird	2		2
Climacteris picumnus	brown treecreeper	2		
Malurus melanocephalus	red-backed fairy-wren			2
Pardalotus striatus	striated pardalote		2	2
Smicrornis brevirostris	weebill		1	3
Gerygone albogularis	white-throated gerygone	3	1	2
Acanthiza nana	yellow thornbill	1		
Lichenostomus virescens	singing honeyeater	11	2	2
Lichenostomus plumulus	grey-fronted honeyeater			9
Lichenostomus penicillatus	white-plumed honeyeater	5		
Manorina flavigula	yellow-throated miner		1	2
Lichmera indistincta	brown honeyeater		3	
Melithreptus albogularis	white-throated honeyeater			4
Entomyzon cyanotis	blue-faced honeyeater	3		1
Philemon corniculatus	noisy friarbird	3	10	
Philemon citreogularis	little friarbird		2	11
Plectorhyncha lanceolata	striped honeyeater	2		
Microeca fascinans	jacky winter	3	2	6
Pachycephala rufiventris	rufous whistler	6		2
Myiagra rubecula	leaden flycatcher	1		
Myiagra inquieta	restless flycatcher	9	3	1
Grallina cyanoleuca	magpie-lark	13		2
Rhipidura albiscapa	grey fantail			3
Rhipidura leucophrys	willie wagtail	14	2	5

Scientific name	Common name	Dam	Ephemeral	Trough
Coracina novaehollandiae	black-faced cuckoo-shrike	1		2
Coracina papuensis	white-bellied cuckoo-shrike	1		
Lalage sueurii	white-winged triller			2
Oriolus sagittatus	olive-backed oriole	1		
Artamus cinereus	black-faced woodswallow	3		
Cracticus tibicen	Australian magpie			1
Corvus coronoides	Australian raven	1		
Corvus orru	Torresian crow	46	1	5
Struthidea cinerea	apostlebird			43
Ptilonorhynchus maculatus	spotted bowerbird			1
Taeniopygia guttata	zebra finch	100		2
Taeniopygia bichenovii	double-barred finch	77		36
Poephila cincta	black-throated finch	34		
Petrochelidon ariel	fairy martin	4		
Petrochelidon nigricans	tree martin	4		

Appendix C – Complete bird species list for water and woodland surveys, indicating species recorded in 2 ha counts and water body counts

Family	Scientific name	Common name	2 ha	Water
Casuariidae	*Dromaius novaehollandiae*	emu	4	5
Phasianidae	*Coturnix ypsilophora*	brown quail	1	
Anatidae	*Anas superciliosa*	Pacific black duck		3
Anatidae	*Anas gracilis*	grey teal		9
Anhingidae	*Anhinga novaehollandiae*	Australasian darter		1
Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		1
Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		1
Pelecanidae	*Pelecanus conspicillatus*	Australian pelican	8	
Ardeidae	*Ardea pacifica*	white-necked heron		2
Ardeidae	*Nycticorax caledonicus*	nankeen night heron	1	
Accipitridae	*Haliastur sphenurus*	whistling kite	18	11
Accipitridae	*Aquila audax*	wedge-tailed eagle	4	1
Falconidae	*Falco berigora*	brown falcon	3	1
Falconidae	*Falco cenchroides*	nankeen kestrel	1	1
Otididae	*Ardeotis australis*	Australian bustard	1	8
Charadriidae	*Elseyornis melanops*	black-fronted dotterel		4
Charadriidae	*Vanellus miles*	masked lapwing		7
Columbidae	*Phaps chalcoptera*	common bronzewing	4	4
Columbidae	*Ocyphaps lophotes*	crested pigeon	20	20
Columbidae	*Geopelia cuneata*	diamond dove	17	14
Columbidae	*Geopelia striata*	peaceful dove	9	11

Columbidae	*Geopelia humeralis*	bar-shouldered dove	3	
Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo	4	7
Cacatuidae	*Eolophus roseicapillus*	galah	37	
Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo	15	7
Psittacidae	*Trichoglossus haematodus*	rainbow lorikeet	26	1
Psittacidae	*Aprosmictus erythropterus*	red-winged parrot	20	10
Psittacidae	*Platycercus adscitus*	pale-headed rosella	74	87
Psittacidae	*Melopsittacus undulatus*	budgerigar	438	322
Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo	5	
Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra	12	
Halcyonidae	*Dacelo leachii*	blue-winged kookaburra	14	
Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher	39	
Halcyonidae	*Todiramphus sanctus*	sacred kingfisher	39	
Coraciidae	*Eurystomus orientalis*	dollarbird	9	4
Climacteridae	*Climacteris picumnus*	brown treecreeper	96	2
Maluridae	*Malurus melanocephalus*	red-backed fairy-wren	192	2
Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote	5	
Pardalotidae	*Pardalotus striatus*	striated pardalote	47	4
Acanthizidae	*Smicrornis brevirostris*	weebill	199	4
Acanthizidae	*Gerygone fusca*	western gerygone	20	
Acanthizidae	*Gerygone albogularis*	white-throated gerygone	50	6
Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill	41	
Acanthizidae	*Acanthiza nana*	yellow thornbill	7	1
Meliphagidae	*Lichenostomus virescens*	singing honeyeater	165	15
Meliphagidae	*Lichenostomus plumulus*	grey-fronted honeyeater	101	9
Meliphagidae	*Lichenostomus fuscus*	fuscous honeyeater	2	
Meliphagidae	*Lichenostomus penicillatus*	white-plumed honeyeater	4	5

Meliphagidae	*Manorina flavigula*	yellow-throated miner	61	3
Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater	2	
Meliphagidae	*Lichmera indistincta*	brown honeyeater	5	3
Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater	29	4
Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater	12	4
Meliphagidae	*Philemon corniculatus*	noisy friarbird	69	13
Meliphagidae	*Philemon citreogularis*	little friarbird	131	13
Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater	41	2
Petroicidae	*Microeca fascinans*	jacky winter	180	11
Petroicidae	*Melanodryas cucullata*	hooded robin	7	
Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler	55	
Neosittidae	*Daphoenositta chrysoptera*	varied sitella	21	
Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	295	8
Pachycephalidae	*Oreoica gutturalis*	crested bellbird	35	
Monarchidae	*Myiagra rubecula*	leaden flycatcher	4	1
Monarchidae	*Myiagra inquieta*	restless flycatcher	40	13
Monarchidae	*Grallina cyanoleuca*	magpie-lark	23	15
Rhipiduridae	*Rhipidura albiscapa*	grey fantail		3
Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	88	21
Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike	67	3
Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike	3	1
Campephagidae	*Coracina tenuirostris*	cicadabird	1	
Campephagidae	*Lalage sueurii*	white-winged triller	3	2
Oriolidae	*Oriolus sagittatus*	olive-backed oriole	4	1
Artamidae	*Artamus cinereus*	black-faced woodswallow	65	3
Artamidae	*Artamus cyanopterus*	dusky woodswallow	4	
Artamidae	*Artamus minor*	little woodswallow	16	

Artamidae	*Cracticus torquatus*	grey butcherbird	33	
Artamidae	*Cracticus nigrogularis*	pied butcherbird	66	
Artamidae	*Cracticus tibicen*	Australian magpie	19	1
Corvidae	*Corvus coronoides*	Australian raven	14	1
Corvidae	*Corvus orru*	Torresian crow	113	52
Corcoracidae	*Struthidea cinerea*	apostlebird	36	43
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird	3	1
Estrildidae	*Taeniopygia guttata*	zebra finch	324	102
Estrildidae	*Taeniopygia bichenovii*	double-barred finch	102	113
Estrildidae	*Poephila cincta cincta*	black-throated finch	6	35
Estrildidae	*Neochmia modesta*	plum-headed finch	65	
Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird	8	
Hirundinidae	*Petrochelidon ariel*	fairy martin		4
Hirundinidae	*Petrochelidon nigricans*	tree martin		4
Megaluridae	*Cincloramphus mathewsi*	rufous songlark	14	
Sylviidae	*Cisticola exilis*	golden-headed cisticola	3	

Appendix D – All fauna records from camera traps (October 2013)

Scientific name	Common name	C01	C02	C03	C04	C05	C09	C10	C12	C14	C15	C16	C17	C18	C19
Birds															
Dromaius novaehollandiae	emu					20						2	10		
Chenonetta jubata	Australian wood duck					23									
Anas superciliosa	Pacific black duck		3				3								
Anas gracilis	grey teal											23			
Aythya australis	hardhead					1									
Pelecanus conspicillatus	Australian pelican											2			
Ardea pacifica	white-necked heron					3						1			
Haliastur sphenurus	whistling kite					4	4								
Accipiter cirrhocephalus	collared sparrowhawk						1			1	2			1	
Aquila audax	wedge-tailed eagle					1									
Falco longipennis	Australian hobby						1								
Ardeotis australis	Australian bustard		1									2	1		
Burhinus grallarius	bush stone-curlew		1						1		2				
Himantopus himantopus	black-winged stilt					7									
Elseyornis melanops	black-fronted dotterel											9			
Vanellus miles	masked lapwing											22			
Phaps chalcoptera	common bronzewing										25		1	11	
Ocyphaps lophotes	crested pigeon	8		3	1	1	2		4	66	2	3			26
Geophaps scripta	squatter pigeon								20				1		28
Geopelia cuneata	diamond dove			15							2			4	
Geopelia striata	peaceful dove										6			15	

Scientific name	Common name	C01	C02	C03	C04	C05	C09	C10	C12	C14	C15	C16	C17	C18	C19
Calyptorhynchus banksii	red-tailed black-cockatoo	2			4						7			32	2
Calyptorhynchus funereus	yellow-tailed black-cockatoo				3										
Eolophus roseicapillus	galah	63			39					33	10			6	85
Cacatua galerita	sulphur-crested cockatoo	1			16				4	3	7	18		7	7
Aprosmictus erythropterus	red-winged parrot			1	5		3			2	5			5	2
Platycercus adscitus	pale-headed rosella	54		10	9	19	33	3	67	61	142	1	2	101	48
Melopsittacus undulatus	budgerigar											160			
Tyto javanica	barn owl														
Dacelo novaeguineae	laughing kookaburra														16
Dacelo leachii	blue-winged kookaburra								2						2
Merops ornatus	rainbow bee-eater												1		
Lichenostomus virescens	singing honeyeater			2						1				1	
Lichenostomus plumulus	grey-fronted honeyeater						1		2						
Lichenostomus penicillatus	white-plumed honeyeater			9											
Manorina flavigula	yellow-throated miner								4	7	1			11	
Melithreptus albogularis	white-throated honeyeater			9											
Entomyzon cyanotis	blue-faced honeyeater								6		1			17	1
Philemon corniculatus	noisy friarbird								6		1			3	
Philemon citreogularis	little friarbird	1					1		18		12			12	
Pomatostomus temporalis	grey-crowned babbler													1	
Grallina cyanoleuca	magpie-lark	17	3		2	8	12		19	45	14	22	2	21	1
Rhipidura leucophrys	willie wagtail	1		2	3			1	5	11	2			5	5
Oriolus sagittatus	olive-backed oriole													2	
Cracticus nigrogularis	pied butcherbird				2		1			9				1	
Cracticus tibicen	Australian magpie	3			1			1	4	15	1			5	7
Corvus coronoides	Australian raven	1											2		

Scientific name	Common name	C01	C02	C03	C04	C05	C09	C10	C12	C14	C15	C16	C17	C18	C19
Corvus sp	Unidentified crow / raven	119	54	4	27	28	137	5	56	47	8	19	11	9	68
Struthidea cinerea	apostlebird	78			8	3				299	39	1		153	173
Ptilonorhynchus maculatus	spotted bowerbird	2			1				6		11			7	10
Taeniopygia guttata	zebra finch					1				72		12	7		85
Taeniopygia bichenovii	double-barred finch			7		14	13	3	5		5	2	64		106
Poephila cincta cincta	black-throated finch						28				3		9	4	
Mammals															
Aepyprymnus rufescens	rufous bettong		2			1			5		3				6
Macropus giganteus	eastern grey kangaroo			67					92	7	85		13	24	
Macropus rufus	red kangaroo			7									1	1	
Macopodidae	unidentified macropod	4	180	52	39	34	134	4	65	223	36			35	77
Canis familiaris	dog		20	2	1	24	14		1			1	5	2	
Felis catus	cat	1		1	1		1				1			1	
Sus scrofa	pig		3			1	27		13						2
Oryctolagus cuniculus	rabbit						1		22		4				
Reptiles															
Varanus sp							1								
Aspidites melanocephalus	black-headed python										1				

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