Black-throated Finch Management Plan

Carmichael Coal Mine and Offsite Infrastructure

Prepared for
~~Adani Mining Pty Ltd~~Bravus Resources and Mining

June~~March~~ 2021~~19~~

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Contents

1 Introduction 6
1.1 Background 6
1.2 Scope and purpose of management plan 6
1.3 Relationship with other management plans 8
1.4 Structure of this management plan 11
1.5 Compliance with approval conditions 11
1.6 Environmental setting 11
1.7 Method 12
1.8 Updates to plan 12

2 Project Description 14
2.1 Project overview 14
2.2 Mine staging 14
2.3 Moray Downs West 16

3 Legislative and Regulatory Framework 17
3.1 Project approval conditions 17
3.2 Approval conditions relevant to BTF management plan 17
3.3 Key legislation 17
3.4 Other guiding documents 18

4 Black-throated Finch (southern) Ecology 20
4.1 Status 20
4.2 Regional populations 20
4.3 Habitat requirements 20
4.4 Breeding ecology 26
4.5 Carmichael population 27
4.6 Threats, potential direct / indirect project impacts 30

5 Adaptive Management Framework 41

6 Mitigation and Management Measures 43
6.1 Mitigation measures 43
6.2 Impact mitigation and management 46
6.3 Impact minimisation measures 46
6.4 Habitat management measures 66
6.5 Offsets 73

7 Monitoring and Research Programs 74

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RTI Act 2009

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7.1 Monitoring program 74
7.2 Research program 84

8 Discussion 87
8.1 Summary of key management issues 87
8.2 Implementation 87

9 Reporting and Compliance 90
9.1 Updating this plan 90
9.2 Reporting 91
9.3 Qualifications 92

10 Commitments and actions included in this plan to be delivered by Bravus 94

References 96

Appendix A Overview of Project Management Plans 101

Appendix B Location of Monitoring Sites 105

Appendix C Black-throated Finch Research Program 111

Appendix D Compliance with Approval Conditions 112

Appendix E Summary of baseline research on BTF nesting and foraging habitat in the project area (E2M Consulting) 121

Appendix F Summary of baseline groundcover characteristics to assist with future management of grazing 122

List of figures

Figure 1 Project Location 9

Figure 2 Flow chart showing the interactions among examples of key management plans and sub-plans for the Carmichael Coal Mine. The BTF Management Plan is shaded green, with regional plans and strategies covering multiple projects shaded blue. 10

Figure 3 Black-throated Finch Habitat within the Project Area and adjacent areas (note this plan does not cover the Moray Downs West Offset Area, which is regulated by the OAMP) 25

Figure 4 BTF Records – 2012 to 2016 (GHD 2012, 2013a, 2013b; Niche 2015a, 2015b, 2016a, 2016b; ELA 2017a; E2M 2017, 2018, 2020; BAAM 2021) 29

Figure 5 Adaptive management framework 42

Figure 6 Map showing the management of grazing across the project area 68

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List of tables

Table 1 Details of staged disturbance areas (note: relates to all areas – not only BTF habitat) ..... 15~~15~~

Table 2 Regional Ecosystem associations for the BTF within the Project Area ..... 21~~21~~

Table 3: Grass species preferred by Black-throated Finches ..... 23~~23~~

Table 4 BTF threats, potential direct / indirect project impacts and matters required to be addressed by conditions ..... 31~~31~~

Table 5 Summary of disturbance to BTF habitat at the Mine, off lease and Rail West aspects of the project over Stage 1 and 2 (CO2 2016) ..... 32~~32~~

Table 6 Ranking of impacts for subsidence, cracking, ponding and infrastructure ..... 34~~34~~

Table 7 Generic mitigation measures to be implemented across the Project Area ..... 44~~44~~

Table 8 Management objectives, performance criteria, adaptive management triggers and corrective actions – Vegetation clearing / habitat loss, including fragmentation of key habitat areas ..... 50~~50~~

Table 9 Management objectives, performance criteria, adaptive management triggers and corrective actions – Potential indirect project impacts ..... 56~~56~~

Table 10 Management objectives, performance criteria, adaptive management triggers and corrective actions – Matters required to be addressed under EPBC Approval, condition 6 ..... 62~~62~~

Table 11 Summary of monitoring measures to be implemented across the Project Area ..... 75~~75~~

Table 12 Water source monitoring sites (those sites marked # have been found to have little to no water during monitoring over the past three years) ..... 78~~78~~

Table 13 Key events in the annual implementation of the BTFMP ..... 89~~88~~

Table 14 Commitments and actions included in this management plan to be delivered by Bravus ..... 94~~93~~

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Abbreviations

Abbreviation	Description
Adani	Adani Mining Pty Ltd
AEIS	Additional Information to the Environmental Impact Statement
BioCondition	A vegetation condition assessment tool which provides a measure of how well a terrestrial ecosystem is functioning for the maintenance of biodiversity values at a local or property scale.
BOS	Biodiversity Offset Strategy
Bravus	Bravus Mining and Resources (previously known as Adani)
BTF	Black-throated Finch
CEMP	Construction Environmental Management Plan
CG	Coordinator-General
~~DES~~	~~Queensland Department of Environment and Science (formerly known as the Department of Environment and Heritage Protection (DEHP))~~
DAWE~~oE~~	Commonwealth Department of ~~the~~ Agriculture, Water and the Environment
DES	Queensland Department of Environment and Science
EA	Environmental Authority issued under the *Environmental Protection Act 1994*
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPBC Approval	Approval granted by the Commonwealth under the EPBC Act
ER	Environmental Representative (also known as Environmental Advisor)
MNES	Matters of National Environmental Significance, as defined under the EPBC Act
MNESMP	Matters of National Environmental Significance plan/s for the management of direct and indirect impacts of mining operations
MSES	Matters of State Environmental Significance
NC Act	Queensland *Nature Conservation Act 1992*
NGBR	North Galilee Basin Rail Project; a 311 km section of the Carmichael Rail Network located between Mistake Creek and the Port of Abbot Point
OEMP	Operations Environmental Management Plan
RE	Regional Ecosystem
SDPWO Act	*State Development and Public Works Organisation Act 1971* (Queensland).
SEIS	Supplementary Environmental Impact Statement, prepared in response to comments on the draft EIS.
SMP	Species Management Plan
SP1	Separable Portion 1; a 77 km section of the Carmichael Rail Network located between the Carmichael Mine and Mistake Creek
TEC	Threatened Ecological Community as defined under the EPBC Act
VM Act	*Vegetation Management Act 1999* (Queensland)
VMP	Vegetation Management Plan

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Commented [YM2]: Updated Commonwealth Department name and re arrange for alphabetical order

Commented [YM3]: I won't abbreviate this to EA, to avoid confusion with Environmental Authority

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1 Introduction

1.1 Background

Eco Logical Australia (ELA) ~~has been~~was engaged by Bravus Mining and Resources (Bravus; previously known as ~~Adani Mining Pty Ltd (~~Adani) to develop a Black-throated Finch (BTF) Management Plan for the construction and operation of the Carmichael Coal Mine and Rail Infrastructure Project in the Galilee Basin of central Queensland. The Carmichael Coal Mine and Rail Infrastructure Project is one of two components of the overall project ~~proposed~~ by ~~Adani~~Bravus, which includes:

1. Carmichael Coal Mine and Rail Infrastructure Project, comprising the Carmichael Coal Mine (open cut and underground coal mine) and 189 km of rail link and associated infrastructure; and
2. North Galilee Basin Rail (NGBR) Project, comprising 310 km of rail from approximately 70 km east of the Carmichael Mine, to the Port of Abbot Point.

The Carmichael Coal Mine and Rail Project and the NGBR Project have been assessed by the Commonwealth and Queensland governments through separate Environmental Impact Statement (EIS) processes. Conditional approval of the Carmichael Coal Mine and Rail Project was granted by the Queensland Coordinator-General on 8 May 2014 and the Commonwealth Minister for the Environment on 14 October 2015 (EPBC 2010/5736). Conditional approval of the NGBR Project was granted by the Queensland Coordinator-General on 12 August 2014 and the Commonwealth Minister for the Environment on 14 October 2015 (EPBC 2013/6885).

The development of a BTF Management Plan is a requirement of the Commonwealth and Queensland approval conditions (refer to **Section 1.5** of this document), to protect BTF and its habitat from avoidable impacts associated with the mine and rail projects.

1.2 Scope and purpose of management plan

This BTF Management Plan is specific to the Carmichael Coal Mine and associated infrastructure component of ~~Adani's~~ the Bravus ~~overall~~ mine and rail project. This document is a BTF Management Plan for the Carmichael Coal Mine (which includes open cut and underground mining) and required associated infrastructure which includes workers' accommodation, an airport, and water supply infrastructure. These combined components of the development are hereafter referred to as the Project (**Figure 1**~~Figure 1~~). This management plan describes the proposed management of direct and indirect impacts of mining operations on BTF which will be implemented throughout the Project.

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The management of the BTF for the rail link component of the Carmichael Coal Mine and Rail Project and the NGBR are addressed in separate documents. Additionally, Species Management Plans for other threatened species and ecological communities, groundwater dependent ecosystems are also addressed in separate documents.

The purpose of the BTF Management Plan is to meet the conditions of approval granted by the Queensland and Commonwealth governments, and commitments made by ~~Adani~~ Bravus in securing these approvals. The BTF Management Plan is consistent with relevant guidelines and policies on the protection of Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and the management of threatened species listed under the Queensland *Nature Conservation Act 1992* (NC Act).

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The BTF Management Plan details the management actions and monitoring requirements for the Carmichael Mine to minimise and mitigate impacts prior to and during construction. Management and monitoring actions apply to mining-related activities across the Project area, including those conducted on ML70505, ML70506 and ML70441. Conceptually, the adaptive management approach to be implemented applies to areas that will be disturbed by mining activities, areas of mining leases where no mining impacts are proposed, and offset areas where BTF habitat will be improved (~~Figure 1~~**Figure 1**).

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However, in relation to the management of offset areas, it should be noted that a detailed Offset Area Management Plan: Moray Downs West (OAMP; C02 2017), has been developed with specific management actions to achieve offsets for a range of environmental values, including BTF. While the BTF management plan includes some reference to management of the offset area, reference should be made to the OAMP for details of specific management actions.

Objectives of the BTF Management Plan are as follows:

- Describe management objectives, performance criteria and practical measures (management actions) to mitigate impacts of the Project on BTF
- Describe monitoring measures that will be implemented to assess the effectiveness of mitigation measures, and inform adaptive management actions
- Describe triggers for the implementation of adaptive management and corrective actions
- Provide a consistent framework across the Project for the mitigation of risks to BTF
- Collate relevant Project commitments relating to mitigation and monitoring of BTF ecological values, to assist in streamlining their implementation, the monitoring of compliance and reporting
- Achieve consistency with other management plans for the Project, related to biodiversity offsets, groundwater dependent ecosystems, construction activities and operations
- Achieve compliance with relevant Commonwealth and Queensland approval conditions (**Appendix D**).

As required under Condition I6a) to c) and I8 of the EA the BTF Management Plan includes a BTF Research Program (**Appendix C**). The purpose of the BTF Research Program is to increase the knowledge of the ecological requirements of BTF populations within and adjacent to the Carmichael Coal Mine and by doing so, inform and improve management of the local populations. The Research Program outlines the studies to be undertaken to identify:

- Specific nesting and feeding requirements of the species
- Whether BTF in the Project Area are sedentary, local migratory or regionally migratory
- Any changes in of classification and / or impact on BTF habitat
- The relationship between water sources, woody habitat and food sources
- Population dynamics, including dietary requirements, home range, nesting requirements
- Responses of the BTF and its habitat to grazing management practices, fire management practices and water body locations

The Research Program will primarily focus on studies that will provide results and information that facilitate improving suitable BTF habitat within the Moray Downs West offset area as well as habitat within ML70506 where no impacts from mining have been proposed or assessed.

This BTF Management Plan will be implemented alongside the Offset Area Management Plan in the approved Offset Areas to ensure there is no~~t~~ net loss of BTF habitat as a result of approved impacts, within the~~Adani's~~ control of Bravus, associated with the project. Additionally, the BTF Management Plan

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will be implemented in non-mined areas of the mining lease to provide further habitat protection and management.

The BTF Research Program has been designed to be concurrently developed and implemented over the first five years of the project, alongside monitoring and management actions. During this first 5 year period, less than 5% of the approved clearing of BTF habitat for the project is planned to have occurred, and the Moray Downs West Offset would be established.

Together, the monitoring, management, research and offset actions will ensure the successful maintenance of BTF habitat to support an ongoing and viable population of BTF.

1.3 Relationship with other management plans

Other plans and strategies have been developed and there will be some interaction among the outputs during construction and operation, as illustrated in **Figure 2**~~**Figure 2**~~.

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This BTF Management Plan has been prepared to be consistent, where appropriate, with the following management plans:

- Biodiversity Offset Strategy for the Carmichael Coal Mine and Rail Project
- Moray Downs West Offset Area Management Plan
- Species Management Plan for the Carmichael Coal Mine
- Environment Management Plan for the Carmichael Coal Mine (Mine; for both construction and operations)
- Groundwater Dependent Ecosystems Management Plan for the Carmichael Coal Mine.

Other management plans will also be developed and implemented where required as part of the mine and offsite infrastructure construction and operation, and align with this plan.

This BTF Management Plan should not be confused with a Species Management Program required under the *Nature Conservation Act 1992*, for tampering with a protected animal breeding place in Queensland. A Species Management Program authorises activities that will impact on breeding places of animals protected under the *Nature Conservation Act 1992*. ~~Adani~~ Bravus will undertake a survey of animal breeding places prior to clearing activities and develop a Species Management Program for approval, consistent with guidelines provided by the Queensland Department of Environment and Science (DES).

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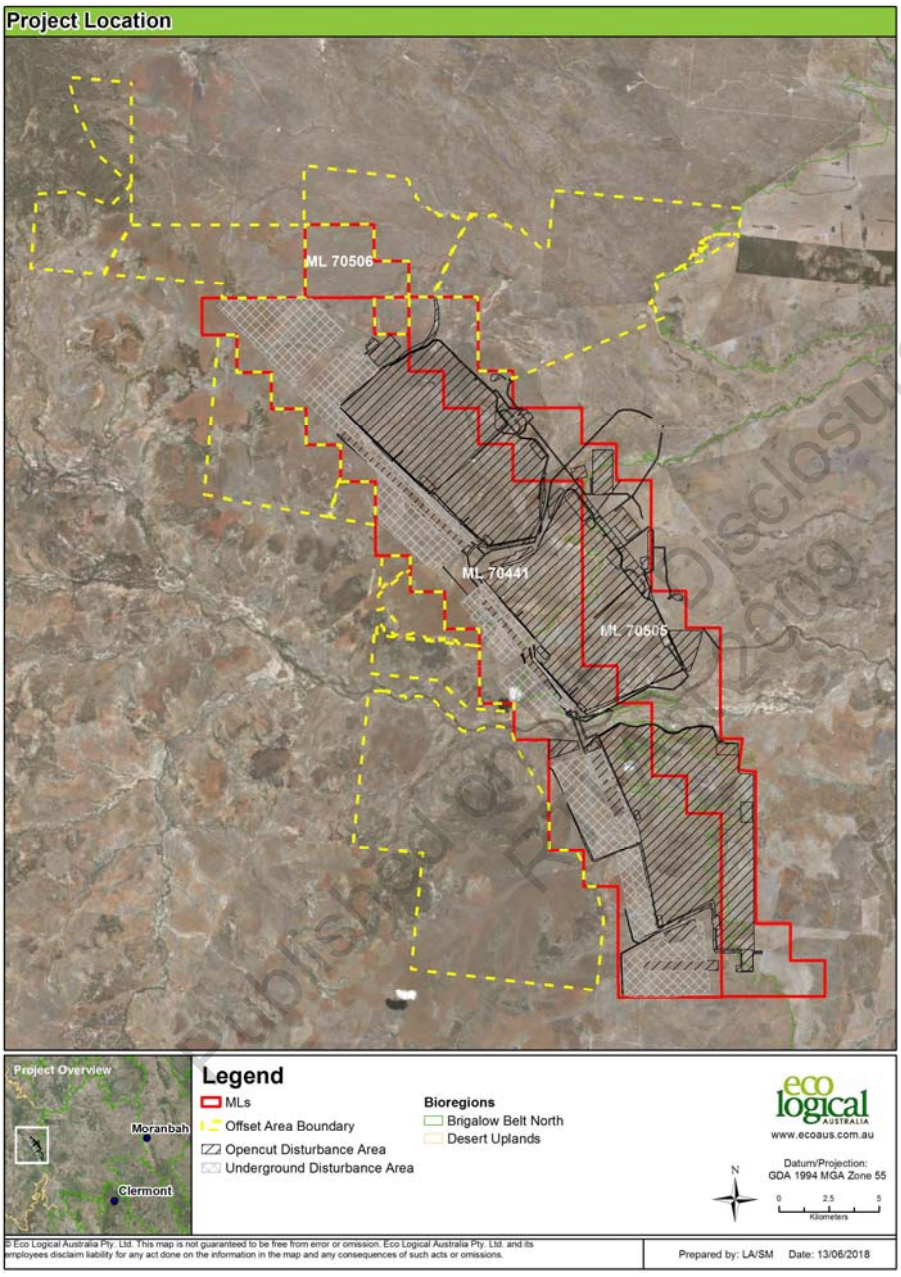

Figure 1 Project Location

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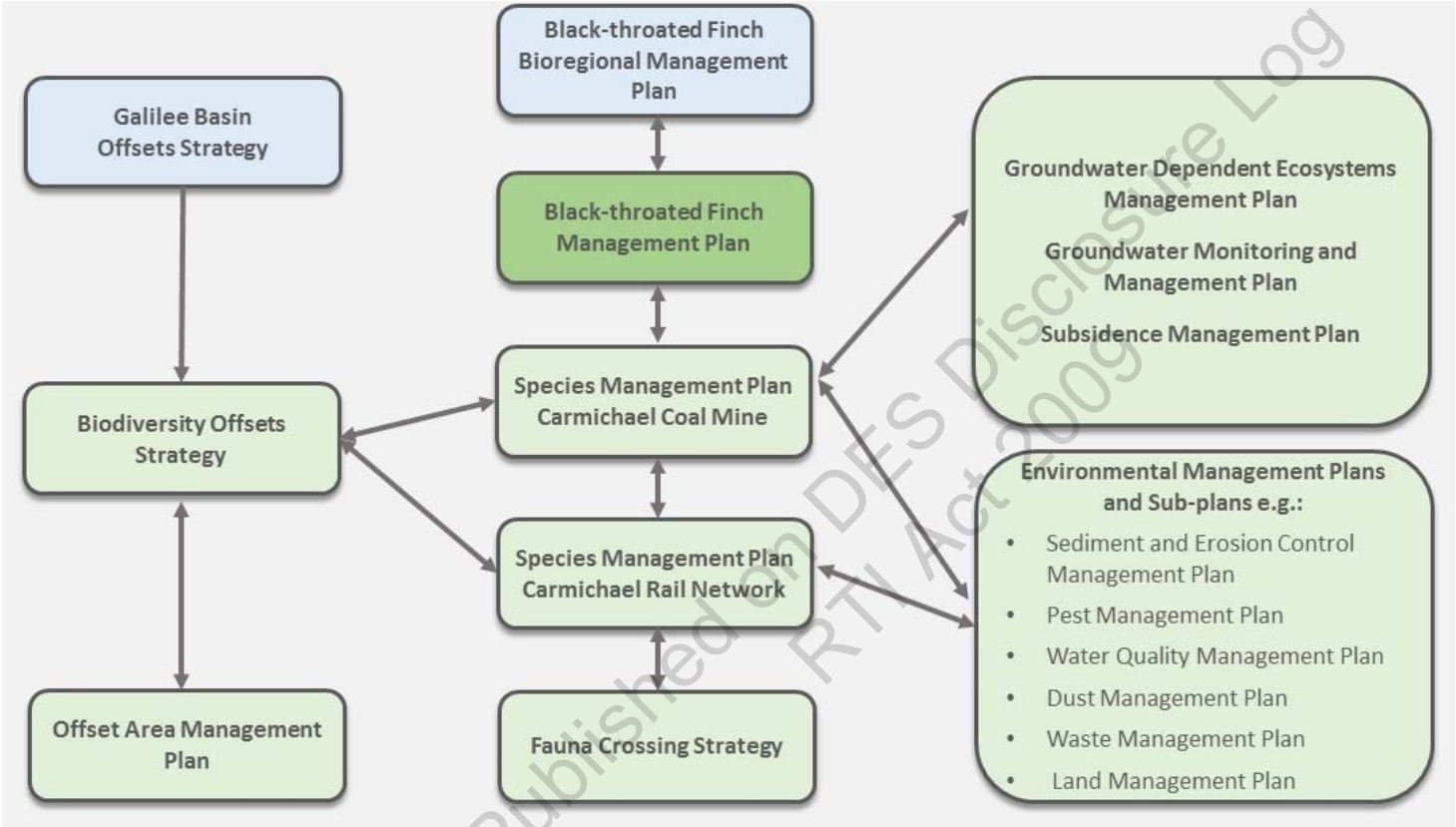

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Figure 2 Flow chart showing the interactions among examples of key management plans and sub-plans for the Carmichael Coal Mine. The BTF Management Plan is shaded green, with regional plans and strategies covering multiple projects shaded blue.

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1.4 Structure of this ~~report~~management plan

This ~~report~~ management plan has been structured to address the requirements of relevant approval conditions and to facilitate practical implementation of management measures 'on the ground'. A summary of key sections is provided below:

- A contextual description of the Project (**Section 2**)
- Overview of the legislative framework and approval conditions to be addressed within the BTF Management Plan (**Section 3**)
- General description of BTF ecology and known threats to the sub-species (**Section 4**)
- Adaptive management framework (**Section 5**)
- Mitigation and management measures for BTF (**Section 6**)
- Monitoring Program for BTF (**Section 7)**
- A discussion of the key outcomes of the management planning process (**Section 8**)
- Arrangements for reporting and monitoring compliance with Species Management Plan actions (**Section 9**)
- A register of key mitigation and monitoring commitments within the Species Management Plan (**Section 10**)

Appendix A provides an overview of project management plans, **Appendix B** shows the location of sites where monitoring will be conducted during BTF surveys and the BTF Research Program is provided in **Appendix C**. **Appendix E** provides a summary of the results of baseline research on BTF nesting and foraging habitat. **Appendix F** provides a summary of baseline groundcover characteristics to assist with future management of grazing.

1.5 Compliance with approval conditions

Compliance matrices indicating where approval conditions and commitments relevant to the BTF Management Plan have been addressed within this report are outlined in **Appendix D**.

1.6 Environmental setting

The Carmichael Coal Mine is located in central Queensland within the Burdekin catchment. It covers the boundary of the Brigalow Belt and Desert Uplands bioregions of Queensland. The Brigalow Belt North and Desert Uplands bioregions are semi-arid, and located in the tropics where summer rainfall dominates, with distinct wet and dry seasons.

The Brigalow Belt North Bioregion is a large and complex area characterised by clay soils with forests and woodlands dominated by Brigalow (*Acacia harpophylla*), eucalypts and grasslands. The general land types include undulating rugged ranges to alluvial plains (Young *et al*. 1999, Bastin 2008). The Desert Uplands Bioregion is characterised by sandstone ranges and sand plains, with thick eucalypt and acacia woodlands, often with a spinifex understory (Bastin 2008). Each of these bioregions is further divided into subregions based on land forms.

The Project Area is located in the Belyando Downs subregion of the Brigalow Belt North Bioregion, and the Alice Tableland subregion of the Desert Uplands. The dominant vegetation communities in these subregions are Silver-leaved Ironbark (*Eucalyptus melanophloia*) and Poplar Box (*E. populnea*) woodlands on alluvial deposits, and Lancewood *(Acacia shirleyi*) and Bendee (*A. catenulata*) woodlands on rocky hills and sandstone ranges (Sattler and Williams 1999). The Brigalow Belt North Bioregion is also dominated by Brigalow and Gidgee (*A. cambagei*) woodlands on fine soils, and Queensland Bluegrass (*Dichanthium sericeum*) grasslands on alluvial deposits; whilst the northern reaches of the

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Alice Tablelands are dominated by White's Ironbark (*E. whitei*) and Reid River Box (*E. brownie*; Sattler and Williams 1999).

The predominant land use of the region is beef cattle grazing, which covers over 90% of the total area (Bastin 2008). Other land uses include conservation and minimal use, forestry, dryland agriculture, horticulture, mining, and urban centres (Dight 2009). There are few major urban centres in the region, with the largest being Bowen, Barcaldine, Collinsville, Alpha, Clermont, and Pentland (Bastin 2008).

The mine is located within the Carmichael River sub-catchment of the Belyando Basin in the Burdekin Catchment. The Belyando Basin is characterised by generally low relief floodplains drained by braided channels and surrounded by wide alluvial plains (Dight 2009).

1.7 Method

Utilising outcomes of previous monitoring surveys conducted during and post the EIS, a team of experienced ecologists was established with local knowledge of the Project Area to develop an effective approach to BTF management (this document). The BTF Management Plan was developed with guidance from relevant Commonwealth and State approval conditions, other legislative requirements for native flora and fauna, relevant species recovery plans occurring within the Project Area, and best-practice approaches to species management. The following key steps were taken to develop the management plan for BTF:

- A review of the ecological requirements relating to BTF was conducted, drawing upon the EIS studies, surveys completed after the EIS, published literature and relevant database searches
- The impacts from a range of activities associated with construction and operation of the Project were considered, including vegetation clearing, subsidence, mine dewatering, earthworks, the generation of noise and vibration, emissions such as dust, light spill and other visual impacts, stream diversion and flood levees and the spread of weed and pest species.
- Measures to mitigate the impacts of the Project on BTF were described, including at locations adjacent to areas of direct disturbance. Mitigation measures were informed by commitments within the EIS and associated Project approvals, and the technical knowledge and experience of ecologists developing this management plan.
- An approach to monitoring BTF was developed for a variety of project stages. These included before the commencement of work (baseline monitoring and pre-clearance surveys), monitoring of impacts during construction, assessing recovery post-construction and monitoring the impacts of ongoing operations.
- Goals, triggers and corrective actions were developed for mitigation measures, to establish a framework of adaptive management for BTF with the potential to be affected by the Project.
- An ongoing system of monitoring was described to determine the effectiveness of the mitigation measures.

Consideration was also given to the potential for impacts at a landscape level and groups of similar species, as Project impacts may not necessarily be manifested on individual BTF or species in isolation.

1.8 Updates to plan

The approved BTF Management Plan (Version 8a) was updated in June~~March~~ 2021 (Version 9) to address a range of matters including:

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- Inconsistencies between the management plan and the requirements of the Environmental Authority with respect to BTF monitoring
- Provide further details on the location of monitoring sites and a refinement of monitoring methods, based on the results of implementation
- A more detailed description of the management of grazing and enhancing habitat values for BTF
- Provide general administrative updates, including the updating of government department names
- Address suggestions from DES on amendments to improve the plan

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2 Project Description

2.1 Project overview

The Project involves construction of a greenfield coal mine in the Galilee Basin over Mining Leases 70441, 70505 and 70506. The mine site is located approximately 160 km north-west of Clermont, with mining to be conducted using both open cut and underground mining methods. Offsite infrastructure to support the mine will include a workers accommodation village, a permanent airport site and water supply infrastructure (associated infrastructure). The total disturbance area will be approximately 28,000 ha for the mine and 1,300 ha for the offsite infrastructure. Coal will be transported by rail to the Port of Abbot Point for export. The operational mine life will be approximately 60 years, with a production rate peaking at 60 Mtpa.

The open cut mine will have a capacity of 40 Mtpa and will be located along the eastern section of Mining Lease 70441. The open cut mine will be operated primarily using truck shovel/excavator methods. A series of open cut pits will be progressively mined. During the early stages of developing each mine pit, overburden will be transported to pit dumps, where it will be profiled and rehabilitated. A proportion of this material will be used to re-profile the high-wall of the final voids (Adani 2012).

Commented [YM5]: Maintaining the old name when it appears in references

The underground mine will operate concurrently with the open cut pits, to provide for coal blending and ensure continuity of production. The underground mine will comprise independent underground longwall mines, producing approximately 20 Mtpa of product. Each underground mine will be serviced by above ground infrastructure.

All run of mine coal will be transported by truck and/or overland conveyor to a centralised coal handling facility, where the high-ash portion will be washed for blending with the bypass coal (un-washed coal). Coal will be stockpiled prior to loading on trains for transportation by rail. The channel and riparian zone of the Carmichael River will be preserved and the adjacent pits protected from flooding events by a levee (Adani 2012).

All offsite infrastructure to support the operation of the mine will be located on the Moray Downs Pastoral Lease (Lot 662 on SP282172) to the east of the mine. The workers accommodation village will be located approximately 12 km east of the Mine and accessed via the upgraded Moray-Carmichael Road. The village will accommodate construction and operational workforces for the Mine. All recreational, health and safety requirements to support workers will be provided at the village.

The permanent airport will be located approximately 5 km west of the workers accommodation village and will provide access for fly-in-fly-out workers. Offsite water supply infrastructure will enable the extraction, storage and delivery of water during the construction and operation phases of the mine.

2.2 Mine staging

The Project will be implemented in several stages. An understanding of the project stages and their relative timing is important for developing appropriate management and mitigation measures to address potential impacts of the Project on BTF and their habitat. The total Project Area (Mining Lease Area) is about 45,000 Ha out of which 28,0571~~6~~ Ha (62%) will be disturbed in several stages for open cut mining, underground mining and mine infrastructure (including, water storage, tailings drying cells, diversion drains and levees), The initial areas of disturbance will be required for opening up of box cut areas for open cut and underground mining and areas required for mine infrastructure. The details of the staged disturbance are provided in **Table 1**~~**Table 1**~~. It is evident from **Table 1**~~**Table 1**~~ that areas will

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be disturbed in a phased manner and will only be cleared commensurate with development of the project within each stage. Some areas of the mining lease will not be impacted by mining activities as evident from Figure 3Figure 3. Where BTF habitat occurs in these areas, management will be to maintain and/or aim to improve the habitat condition.

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Key elements of the Project and their relative timing are summarised in the following sections.

Table 11 Details of staged disturbance areas (note: relates to all areas – not only BTF habitat)

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Disturbance Mine domain	Domain Area (hHa)	Disturbance Areas (Ha)			
		Year 1-10	Year 11-20	Year 21-630	Total Max
Open cut Mining (Including pits, slopes voids and out of pit spoil dumps)voids and slopes	16,640.248260.61	3658.6210332.66	2011.953682.75	2590.042624.83	8260.61
Underground Mining and (subsidence boundaryareas)	7786.786	1931.951931.95	3030.163030.16	2824.672824.65	7786.78
Infrastructure Area (including, water storage, tailings drying cells, diversion drains and levees)Mine infrastructure	2128.7435892.93	2007.1340 3.89	110.42174.82	11.2211.22	2128.74
Out-of-pit spoil dumps	8079.90	6374.31	1670.80	34.79	8079.90
Water storage areas	1190.08	911.01	230.69	48.38	1190.08
Stream diversions	472.68	412.26	60.34	0	472.60
Tailings drying cell	47.45	47.45	0	0	47.45
Carmichael River corridor and levees	1799.02	50.78	0	0	50.78
Carmichael River	1748.24	0	0	0	0
Exploration	N/A	40.51	0	0	40.51
Total	28,016.93	15,668.50	6,887.73	5,460.70	28,057.45
% disturbance		56%	25%	19%	

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2.2.1 Open cut Mining Operations

Open cut Mining operations include extraction of coal from the ground as well as any immediately associated activities, including initial clearing of vegetation, removal and storage of overburden, storage of coal and dewatering, but not including exploratory surveys or the construction or operation of transport, accommodation or power generation infrastructure.

- The Open cut mines consist of six pits from North to south of the Mining Lease area
- Pits B, C, D and E are located to the north of the Carmichael River.
- Pits F and G are located to the south of the Carmichael River.

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Open cut mining activities will be carried out in three stages of the project across 60 years of life of the project. Stage 1 of Open cut mining is defined as year 1-10 and includes all associated activities such as box cut excavation, formation of haul roads, forming of out of pit spoil dumps and building mine related infrastructure like CHPP, ROM, Product coal storage areas, water infrastructure and waste storage facilities.

Activities associated with mining operations north of the Carmichael River are anticipated to commence in Year 1 (early stages of the Project). In this area open cut Pits D and E will be opened up initially during the first year of the start of mining. During later years, additional Pits B and C will be opened up to the north of the Mining Lease area. As shown in **Figure 3**, there is minimal BTF habitat in areas immediately north of Carmichael River (Pits D and E), which will be the focus of early stages of the Project. This delay in the disturbance of BTF habitat will coincide with improvements to BTF habitat in the offset area, minimising Project impacts on BTF habitat values overall.

Mining operations south of the Carmichael River are anticipated to commence in Year 8 (i.e., 7 years after the commencement of mining operations north of the Carmichael River). In this area open cut Pits F and G will be opened up and will continue till the end of project life.

2.2.2 Underground Mining

Underground mining will be completed in three stages across the 60 year life of the Project. Stage 1 of underground mining is defined as Years 1-10 and includes all associated activities including box cut excavation, portal construction, long wall construction and longwall panel mining. Multi seam mining within the first underground mine will occur during this time. Stage 2 of underground mining will occur from approximately Year 11-23 and Stage 3 will occur from approximately Year 24 and beyond.

2.3 Moray Downs West

The Moray Downs West offset area has been identified in the approved BOS as a priority offset to acquit most of the Project's offset requirements, including those required for BTF (CO2 2016). The offset area for offset delivery stage 1 is located on the western portion of the Moray Downs property (Lot 662 on SP282172; **Figure 1**~~**Figure 1**~~).

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Parts of Moray Downs West are mapped as priority 1 areas in the Queensland Government's Galilee Basin Offset Strategy (DEHP 2013). Priority 1 areas contain high levels of conservation value and are likely to have the lowest risk of future development through mining. Moray Downs West also borders priority 1, 2 and 3 Galilee Basin Offset Strategy areas.

The offset area includes 20,274 ha of BTF habitat. It is anticipated that the management objectives will be achieved within the 20 year management period through the implementation of adaptive management. However, if required additional management will be considered at the end of the management period should any of the objectives not be met (CO2 2016). Monitoring is likely to be required beyond 20 years to clearly demonstrate the effectiveness of the offset, and to achieve compliance with EPBC Act approval conditions, which require monitoring for the life of the project.

Mining activities south of the Carmichael River will trigger the requirement for Stage 2 of offset delivery. As part of the identification of suitable offsets for Stage 2, ~~Adani~~ Bravus will prioritise the opportunity to include ML70506 and other areas of Moray Downs not in Stage 1 as part of the Stage 2 Offsets Area.

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3 Legislative and Regulatory Framework

3.1 Project approval conditions

The Project Area provides habitat for a variety of threatened species, listed under the EPBC Act or the NC Act State and Commonwealth approval conditions require the development of management plans for those species and ecological communities that were considered most likely to be affected by the Project.

For the Commonwealth approval, these species and communities are as follows:

- Black-throated Finch (southern; *Poephila cincta cincta*) - Endangered
- Squatter Pigeon (southern; *Geophaps scripta scripta*) - Vulnerable
- Ornamental Snake (*Denisonia maculata*) - Vulnerable
- Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC - Endangered
- Yakka Skink (*Egernia rugosa*) - Vulnerable
- Waxy Cabbage Palm (*Livistona lanuginosa*) - Vulnerable
- Doongmabulla Springs Complex – Nationally Important Wetland and a community of native species dependent on natural discharge of groundwater from the Great Artesian Basin TEC - Endangered

For the State approval, the Coordinator-General recommended in Section 2 of Appendix 2 of its report that a Species Management Plan be prepared for all threatened species known, or likely to, occur within the Project Area. Within the mining lease, ~~Adani~~ Bravus has committed to a range of environmental management measures to reduce impacts on threatened species.

3.2 Approval conditions relevant to BTF management plan

There are multiple Commonwealth and Queensland approval conditions that require ~~Adani~~ Bravus to prepare a BTF Management Plan, describing how potential impacts of the Project on ecological values will be mitigated and monitored. This report addresses the requirements of these conditions for both Commonwealth and Queensland legislation. This document is specific to the Carmichael Coal Mine and associated infrastructure and addresses the approval conditions relating to BTF for this component of ~~Adani's overall~~the Bravus mine and rail project. Conditions relevant to the rail components of the Carmichael Coal Mine and Rail Project have been addressed separately (ELA 2015c; ELA 2015d).

An inventory of all relevant Commonwealth and State approval conditions is provided in **Appendix D**, with a description of the location within this report where each condition has been addressed.

3.3 Key legislation

Assessment of the Project by the Commonwealth Government occurred through the EIS process under the Commonwealth EPBC Act. This assessment considered potential impacts of the Project on MNES, such as federally-listed threatened species, migratory species, and threatened ecological communities.

Assessment of the Project by the Queensland Government occurred through the EIS process under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). This act provides for the assessment of 'coordinated projects' by the Coordinator-General, while considering other Queensland legislation relevant to the proposed activity, including the:

- *Environmental Protection Act 1994*

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- *Nature Conservation Act 1992*
- *Vegetation Management Act 1999*

~~Adani~~ Bravus began formal environmental assessment of the Carmichael Coal Mine and Rail Project in 2010, through preparation of an EIS, to address the Commonwealth and Queensland government approval requirements. The Project was declared a 'significant project' under the SDPWO Act requiring an EIS and was assessed to be a 'controlled action' requiring assessment and approval under the EPBC Act.

An EIS was prepared in accordance with the bilateral agreement between the Commonwealth of Australia and the State of Queensland, with the objective of avoiding or mitigating potentially adverse impacts on environmental, social and economic values and enhancing positive impacts. Where there were unavoidable residual impacts, offsets were proposed in accordance with State and Federal government policies.

~~Adani~~ Bravus prepared an SEIS in accordance with Section 35 (2) of the SDPWO Act and the bilateral agreement between the Commonwealth of Australia and the State of Queensland. The SEIS provided revised and additional environmental studies undertaken to reflect the amendments made to the Project since the EIS publication and to address matters raised in submissions. It included revised technical studies, impact assessment and management plans for a range of project issues.

The Carmichael Coal Mine and Rail Project was subsequently approved by the Queensland Coordinator-General on 8 May 2014, subject to conditions. The project was approved by ~~DoE~~ the Commonwealth Government on 14 October 2015, subject to conditions (EPBC 2010/5736).

~~Adani~~ Bravus was granted an Environmental Authority (EA) EPML01470513 for the Carmichael Coal Mine on 2 February 2016 in which conditions relating to the Black-throated Finch were also imposed. These conditions require a management plan and research program.

In addition to State and Federal approval conditions, ~~Adani~~ Bravus made commitments in regards to the management of BTF within the Coordinator-General report. **Appendix D** describes the relevant approval conditions and / or commitment relating to the monitoring and management of BTF and where the condition is addressed within this management plan.

3.4 Other guiding documents

In accordance with the Environmental Authority (EA) Condition I6 and ~~Adani~~ Bravus company commitment P6.54 the BTF Management Plan has been developed to align with the following references:

- National recovery plan for the Black-throated Finch southern subspecies *Poephila cincta cincta*. Report to the Department of the Environment and Water Resources, Canberra (Black-throated Finch Recovery Team, 2007)
- Significant impact guidelines for the Endangered Black-throated Finch (southern; *Poephila cincta cincta*) - EPBC Act policy statement 3.13 (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009)
- Two threat abatement plans that specifically reference the Black-throated Finches, being:
  - for competition and land degradation by rabbits (DEWHA, 2008)
  - to reduce the impacts on northern Australia's biodiversity by the five listed grasses DSEWPAC (2012)

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- Commonwealth Listing Advice on Southern Black-throated Finch (*Poephila cincta cincta*; Department of the Environment, 2005), and
- Queensland Government Bio-regional BTF Management Plan as required under the Coordinator-General's report about the Project, currently under development by DES.

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4 Black-throated Finch (southern) Ecology

EPBC Condition 6a) requires that all MNES management plans include a description of the environmental values for each particular MNES.

4.1 Status

The Black-throated Finch (southern; BTF) is listed as endangered under the EPBC Act and the NC Act. The primary reason for the listing is the decline in size and extent of the population of the southern subspecies.

4.2 Regional populations

The southern subspecies of the BTF lives in the Brigalow Belt North and Desert Uplands bioregions of Queensland, which cover 135,500 km^2 and include the towns of Townsville, Bowen, Emerald, Clermont and Collinsville (Buosi 2011).

Based on mapping of all records of BTF up to 2010 and a comparison with post-2000 records, the distribution of BTF is estimated to have contracted by 50-80% of its historical range and is now rarely recorded south of Clermont (160 km south of the Project Area; Buosi 2011). BTF have also disappeared from several sites around Townsville (Garnett *et al*. 2011).

4.3 Habitat requirements

A summary of baseline research (2012 to 2018) on the characteristics of BTF nesting and foraging habitat within the project area is provided in **Appendix E~~D~~**. Black-throated Finch habitat typically consists of grassy eucalypt woodlands adjacent to water or riparian corridors (Zann 1976; Isles 2007; Mitchell 1996; Higgins *et al*. 2006; NRA 2007; Bravery 1970). Preferred habitat consists of patches with suitable grasses, low vegetation density or bare ground to allow access to the seed bank and an open tree layer that does not have a continuously dense shrubby understorey (Rechetelo, 2015). Mitchell (1996) noted that the southern subspecies requires a mosaic of different habitats during the wet season in which to find seed. This subspecies has also been recorded in degraded habitats, including cultivated areas near woodlands and heavily grazed paddocks (DoE 2016).

The species can be found in a range of woody plant communities with records known from at least 21 Regional Ecosystems (RE; Vanderduys *et al*. 2016). Woodland vegetation typically consists of ironbark (e.g. *Eucalyptus melanophloia*, *E. crebra* and *E. drepanophylla*), bloodwood (*Corymbia dallachiana*, *C. erythrophloia* and *C. clarksoniana*) and gums (*E. platyphylla* and *E. brownii*). Records from other vegetation communities includes wetlands, riparian paperbark woodlands and native grasslands (Vanderduys *et al*. 2016). Approximately 78% of records within the Galilee Basin region are associated with Broad Vegetation Group (BVG) 17b which is described as 'woodlands to open woodlands dominated by *Eucalyptus melanophloia* (Silver-leaved ironbark; or *E. shirleyi*; Shirley's silver-leaved ironbark) on sand plains and footslopes of hills and ranges' (Dreis unpublished).

In the Project Area, grassy open-woodland communities dominated by *Eucalyptus melanophloia* (RE 10.5.5a) are preferred, though the species is not restricted to this community (ELA 2017a, Niche 2015a, Niche 2015b, Niche 2016a, Niche 2016b). Other habitats where BTF have been recorded on multiple occasions include *Eucalyptus brownii* open-woodland (RE 10.3.6ax1), and less commonly in *Eucalyptus similis* and *Corymbia brachycarpa* open-woodland (RE 10.5.1a) and *Corymbia setosa* open-woodland (RE 10.5.1d; ELA 2017a). Table 2~~Table 2~~ lists all REs identified in the Project Area that are considered

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as potential habitat. The definition of potential habitat also includes any woodland or grassland REs recognised as habitat in the BTF Recovery Plan within 5 km of:

- an existing confirmed BTF record, or
- a permanent water source (e.g. dams, bores, troughs, wetlands or watercourses of stream order 3 and above)

BTF habitat within the Project Area generally consists of an open-woodland (approximately 17 % canopy cover) with moderately low canopy (approximately 12 m) and low canopy species richness. The shrub layer is typically low (2 to 2.5 m) and sparse (less than 10 % cover) but a moderately high species diversity. The ground cover is dominated by native grasses (approximately 35% cover and 8 species) with moderate bare ground (34% cover). Exotic grass and herb / forb cover are typically low (less than 5%; **Appendix E**).

Table 22 Regional Ecosystem associations for the BTF within the Project Area

RE	Description	Habitat Code
10.5.5a	~~*Eucalyptus melanophloia* dominates the very sparse canopy. *Corymbia plena* and *C. dallachiana* are occasionally co-dominants in the canopy. *Petalostigma pubescens* and *Acacia spp.* occasionally occur as dominants or as scattered tress in the very sparse to mid-dense low tree layer. *Carissa lanceolata, Psydrax oleifolia* and *Denhamia cunninghamii* frequently occur in the very sparse to sparse shrub layer. *Triodia pungens is often dominant in the very sparse to mid-dense ground layer. Aristida spp., Bothriochloa ewartiana, Eriachne mucronata, Eragrostis lacunaria and Heteropogon contortus* occasionally occur as dominant or codominant graminoids. Occurs on sandplain.~~ *Eucalyptus melanophloia* dominates the very sparse tree layer with very sparse ground layer of *Aristida* spp. and/or *Triodia* spp. Occasionally present are small areas of *Acacia sericophylla* or *Archidendropsis basaltica* or rarely grassland. Occurs on loamy red and yellow earths on undulating sandplains. RE 10.5.5a occurs commonly as BTF habitat in the project area.	*Eucalyptus melanophloia* dominant
10.3.6ax1	*Eucalyptus brownii* dominates the very sparse tree layer with scattered shrubs and very sparse ground layer frequently dominated by *Aristida contorta*. Occurs on flat to gently undulating sandplain.	*Eucalyptus brownii* dominant
10.3.6a	*Eucalyptus brownii* dominates the very sparse to sparse canopy. *Corymbia dallachiana* and *E. melanophloia* frequently occur in the canopy and sometimes as codominants. *Lysiphyllum carronii, Acacia excelsa, Grevillea striata, Atalaya hemiglauca, Eremophila mitchellii, Melaleuca nervosa* and *Ventilago viminalis* frequently occur in the very sparse lower tree layer. There is often a very sparse shrub layer usually dominated by *Carissa lanceolata*. Other shrubs frequently present include *Denhamia cunninghamii, Eremophila mitchellii, Acacia salicina, A. sericophylla* and *Psydrax oleifolia*. The ground layer varies from very sparse to mid-dense with variable dominant graminoids including *Bothriochloa ewartiana, Aristida latifolia, Triodia pungens, Aristida calycina, Fimbristylis dichotoma, Chrysopogon fallax, Iseilema vaginiflorum, Dichanthium fecundum, Eragrostis lacunaria, Tripogon loliiformis* and *Eulalia aurea*. Occurs on alluvial plains.	
10.3.13a	Riverine wetland or fringing riverine wetland. *Eucalyptus camaldulensis* dominates the very sparse to sparse canopy. *E. coolabah, Casuarina* cunninghamiana and Melaleuca leucadendra are frequently present in the canopy. *Corymbia tessellaris* is occasionally present. Melaleuca spp. are frequently present in the mostly very sparse low tree layer. Graminoid *Lomandra longifolia* is commonly present in the very sparse to sparse ground layer. Occurs along watercourses.	Riverine
10.5.1a	*Eucalyptus similis* dominates the usually very sparse canopy. *Corymbia brachycarpa* is frequently present in the canopy. *Eucalyptus*	*Eucalyptus* or *Corymbia* spp.

Commented [YM7]: Additional aspects added to the habitat definition, consistent with new Bravus approach to mapping threatened species habitat from April 2021. New description is broader than the older one, so more conservative.

Commented [YM8]: Table updated to include REs found along Mine Access Road, the upgrade of which forms part of the off site infrastructure part of the project.

Also 10.5.5a changed to 10.5.5 to be consistent with new habitat definitions for threatened species established by Bravus in April 2021. Change broadens habitat description, so is more conservative.

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RE	Description	Habitat Code
	drepanophylla can occasionally occurs as a codominant. The low tree layer is very sparse or composed of scattered small trees including *Bursaria incana, Acacia sericophylla, Alphitonia excelsa* and *Grevillea glauca*. A very sparse to mid-dense tall shrub layer is often present and dominated by *Acacia spp. Petalostigma pubescens and Persoonia falcata are* commonly present. A low shrub layer is usually present and dominated by *Carissa lanceolata. Triodia pungens* usually dominates the very sparse to mid-dense ground layer. Occurs on sandplains.	dominant with shrub layer
10.5.1d	*Corymbia setosa* dominates the very sparse canopy. *Melaleuca nervosa, Acacia sericophylla, A. elachantha, Bursaria incana, Grevillea glauca* and *Petalostigma pubescens* are frequently present in the very sparse low trees layer or occur as scattered small trees. *Acacia spp*. and *Carissa lanceolata* dominate the very sparse shrub layer. The ground layer is usually dominated by *Triodia pungens*. Occurs on sandplains.	
11.3.10	*Eucalyptus brownii* woodland to open woodland. The ground layer is typically tussock grasses, including *Aristida* spp., *Chloris* spp., *Fimbristylis dichotoma*, *Eriachne* spp., *Eragrostis* spp. and *Chrysopogon fallax*. Areas on fertile soils may contain *Heteropogon contortus*, *Bothriochloa bladhii* and *Chrysopogon fallax*. Occurs on Cainozoic alluvial plains.	*Eucalyptus brownii* dominant
11.5.3	*Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana +/- C. dallachiana* and occasionally *E. cambageana* or *E. brownii* woodland. Localised areas may be dominated by *E. melanophloia*, occasionally *E. crebra* and other canopy species. There is typically a secondary tree layer, including *Eremophila mitchellii, Geijera parviflora, Archidendropsis basaltica, Erythroxylum australe, Cassia brewsteri, Ventilago viminalis, Allocasuarina luehmannii* and *Callitris glaucophylla*. A low shrub layer of *Carissa ovata, Erythroxylum australe, Capparis lasiantha* commonly occurs. Occurs on flat to gently undulating plains formed from Cainozoic sediments. Associated soils are generally deep texture contrast with thick sandy surface horizons with some deep red earths.	*Eucalyptus* woodland

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Grazing and fire are important drivers of the composition and structure of both the woody and ground layers of the vegetation (Buosi 2011, NRA 2007). Details on how grazing and fire impact the structure and composition of vegetation relevant to the BTF are provided in **Sections 4.6.4** and **4.6.5** respectively. Managing these factors is therefore important for the maintenance and management of BTF habitat. The optimal grazing and fire regimes required to maintain or improve habitat quality for the BTF are yet to be determined. Trials to determine the appropriate management of habitat with grazing and fire are proposed as part of the Carmichael Coal Mine BTF Research Program (**Appendix C**), the results of which will feed back into the BTF Management Plan.

Permanent water is critical for the BTF as it provides refuge during dry periods and because they need to drink every day (Buosi 2011, NRA 2007). This water may be in the form of natural springs, perennial streams, waterholes in ephemeral creeks or man-made water sources such as farm dams and troughs. Therefore water must be within an accessible distance from their foraging and nesting habitat, and nests within the Townsville Coastal Plains populations are typically constructed in trees within 400 m of water sources (Buosi 2011, NRA 2007). However BTF monitoring results from the Project Area have identified a mean distance of approximately 2.5 km between nests and known permanent water sources, with the closest nest 280 m from water and the furthest almost 7 km from water (**Appendix E**).

Foraging habitat must provide suitable seeds, principally of grasses (Buosi 2011, NRA 2007). There must be an appropriate density and diversity of grasses, with seeds available and accessible on the surface as the birds predominantly feed on fallen seeds. A mix of grass species that seed at different times is important to provide year round food supply as BTF can experience food shortages particularly in the lead

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up to the wet season (Buosi 2011). The ground layer of the vegetation is ideally dominated by a diversity of annual and perennial grasses with sufficient inter-tussock spacing to allow the birds to forage efficiently for grass seeds present on the soil surface. Studies in the Project Area between 2012 and 2018 have identified a ground layer containing a mosaic of approximately 37% native grass cover and 34% bare ground as well as at least 8 native grass species and less than 5% exotic grass cover is preferred. BTF have not been recorded foraging in areas with more than 50% exotic grass cover (**Appendix E**).

Commented [YM9]: Clarification that this data includes that from 2012 to 2018 as per Appendix E.

Grass seed abundance usually peaks around the early dry season (May to June) and gradually declines through until the next wet season. Consequently, BTF can experience food shortages at particular times of year. The onset of wet season rains causes any remaining seed to germinate or rot, resulting in a significant food shortage (Buosi 2011) that can cause BTF to forage for longer in order to meet their needs. Table 3~~Table 3~~ lists preferred grass species for the BTF based on research and studies in the Townsville Coastal Plains, Cape York Peninsula and Mareeba. Most are derived from observations of where BTF individuals were seen foraging. A summary of baseline (2013 and 2014) groundcover and grass species at selected monitoring sites across the Project Area is provided in **Appendix F**.

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Table 3~~3~~: Grass species preferred by Black-throated Finches

Grass species	Location	Method	Reference
Favoured			
Setaria surgens*	Cape York Peninsula Mareeba West of Townsville	Direct observation of feeding by *P. c. atropygialis* and *P. c. cincta*	Zann (1976)
Digitaria ciliaris*			
Stylosanthes humilis*			
Dactyloctenium radulans*			
Setaria surgens*	Cape York Peninsula Mareeba West of Townsville	Observed to be dominant at sites used by Black-throated finches	Zann (1976)
Melinis repens			
Schizachyrium fragile			
Panicum seminudum			
Aristida superpendens			
Aristida ingrata			
Aristida calycina			
Urochloa mosambicensis	Townsville Coastal Plain	Direct observation of feeding birds	Mitchell (1996)
Digitaria ciliaris*			
Alloteropsis cimicina	Townsville Coastal Plain	Abundant on plots where Black-throated finches were foraging	Isles (2007)
Alloteropsis semialata			
***Chloris* spp.**			
Setaria apiculata			
Urochloa mosambicensis			
Chrysopogon fallax	Townsville Coastal Plain	Abundant on plots where BTF were foraging	Rechetelo (2015)
***Eragrostis* spp.**			
Setaria surgens*			

Bold species indicate those that have been recorded in the Project Area

* Indicates species which BTF have been observed foraging on in the Project Area

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Within the Project Area BTF have been observed foraging on similar species as indicated in Table 3~~Table 3~~, as well as additional grasses including:

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- *Enteropogon ramosus* (GHD 2012)
- *Paspalidium rarum* (GHD 2012 and Niche 2016)
- *Schizachyrium fragile* (GHD 2012)
- *Cymbopogon bombycinus* (ELA 2017)
- *Triodia pungens* (ELA 2017)
- *Eriachne mucronata* (ELA 2017 and E2M 2018)
- *Bothriochloa ewartiana* (E2M 2018)
- *Panicum effusum* (E2M 2018)
- *Enneapogon polyphyllus* (E2M 2018)
- *Sehima nervosum* (E2M 2018)
- *Digitaria brownii* (E2M 2018).

During the 2016 dry season survey BTF were observed foraging on the seeds of the introduced woody herb *Stylosanthes scabra* (ELA 2017a).

The BTF monitoring surveys for the Project Area have indicated some differences with grass species that have been previously identified as being avoided in research undertaken on the Townsville Coastal Plains. In particular, the "avoided" species *Heteropogon contortus* and *Aristida spp.* have been commonly found at foraging sites in the Project Area, at varying percentage cover. At this stage the nature and scale of these differences are unknown, with monitoring programs currently underway to provide further clarity. In this regard, there remains ecological behaviours that are not fully understood for the local BTF population and their foraging requirements. Further surveys dedicated to analysing foraging behaviours of BTF within the Project Area, and comparison of the data, are required to identify the key factors that define preferred foraging habitat for the local BTF population and form part of the Research Program (ELA, 2017b). Initial findings from baseline monitoring are provided in **Appendix E** and **Appendix F**.

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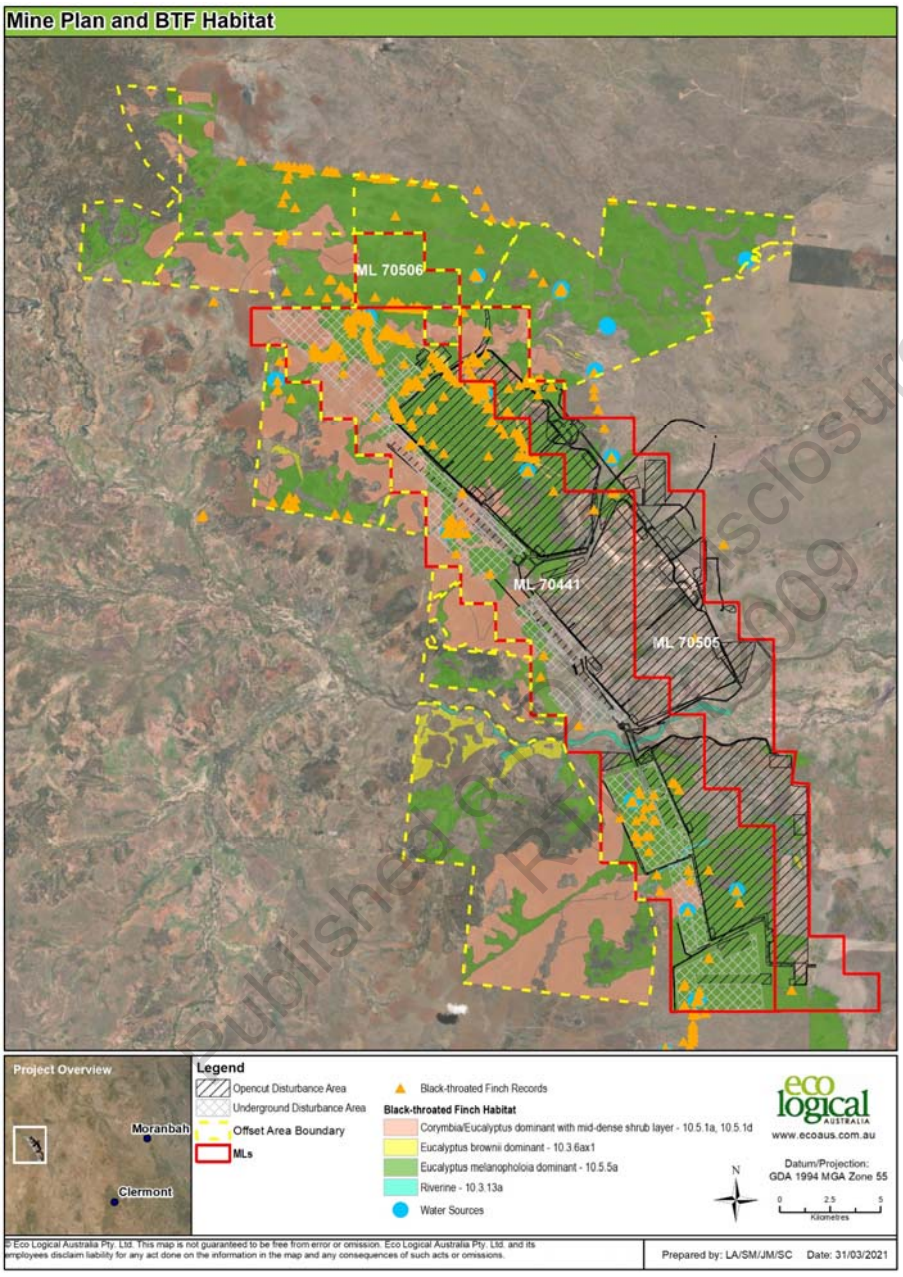

Figure 3 Black-throated Finch Habitat within the Project Area and adjacent areas (note this plan does not cover the Moray Downs West Offset Area, which is regulated by the OAMP)

Commented [YM10]: Map updated with all BTF sightings to date and water watch sites consistent with other maps.

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4.4 Breeding ecology

BTF breeding season is from October to ~~April~~May, with seasonal and geographic variations (Bousi 2011). The timing and duration of the breeding season appears to be contingent on food resources and is therefore likely to vary annually and geographically according to rainfall patterns, temperature and land condition. Commencement of the wet season is the likely trigger for breeding.

Commented [YM11]: Updated to reflect possible later timing due to climatic conditions, and for consistency with paragraph 2 which mentions May.

Around Townsville, breeding tends to occur from December to May, which generally encompasses the wet season and the period of most prolific seeding of grasses (T. Grice pers. comm.), but there is considerable variation in this timing throughout the bird's range. Breeding will continue throughout grass seeding generated by the wet season.

NRA (2005a) recorded BTFs breeding in Townsville from January to July; analysis of data contained in Mitchell (1996) recorded breeding in Townsville from March to May; and Bravery (1970) recorded breeding on the Atherton Tableland from September to January. Although under optimal conditions the species can probably breed continuously throughout the year, the core breeding season around Townsville is believed to begin sometime after the onset of the wet season and continue until ground-stored food resources (fallen grass seed) fall below an undetermined threshold (c. February to June). Usually five or six eggs are laid at one time (Buosi 2011).

There is little published information regarding the timing of the breeding cycle of this species. In a study of relatively few captive individuals Zann (1976) observed the timing of the breeding cycle of this species to be 15 days for incubation, 22 days from hatching to fledging and 18 days from fledging to independence. This indicates they are 40 days old at independence. With respect to independence, Buosi (2011) notes that BTF juveniles may remain with their parents for a number of months after fledging.

Nests are mostly built high in the outer branches of trees and tall shrubs, in tree-hollows, in mistletoes, and in the base of raptor nests (BTFRT 2007). However, nests have also been recorded in large shrubs within 1 m of the ground. Occasionally nests are constructed beneath active raptor nests, of species such as Wedge-tailed Eagle (*Aquila audax*), Whistling Kite (*Haliastur sphenurus*), Swamp Harrier (*Circus approximans*) and Collared Sparrowhawk (*Accipiter cirrocephalus*; Higgins *et al*. 2006). Nests may also be built in neighbouring trees within the colony, usually less than 50 m from other nest trees (Higgins *et al*. 2006; NRA 2006) and on occasion an outlier may be up to 250 m from the main colony (Isles 2007; NRA 2007).

Within the Project Area, BTF nests have been recorded in various vegetation strata and species, with an apparent preference for the tall shrub layer dominated by *Acacia sericophylla*, typically at 2 to 4 m in height. Other nests have been recorded in the canopy layer at 7 m in height. BTF nests ~~were~~ have been most commonly found in *Acacia sericophylla*, ~~(12 records), followed by~~ *Grevillea parallela* ~~(2 records)~~ and *Eucalyptus melanophloia* (~~1 record;~~ E2M 2018; BAAM 2021; **Appendix E**).

Commented [YM12]: Updated to reflect more recent findings and be less specific given new data

The minimum area of nesting habitat required to sustain a viable breeding colony is unknown (NRA 2007). Most known nesting colonies are connected to larger areas of remnant vegetation. Following observations of a single colony, it has been suggested that a minimum remnant habitat patch of 40 to 50 ha within 500 m of a nesting colony may be required for that colony to remain viable, at least in the short-term (NRA 2006; NRA 2007). Nests are typically constructed from grass stems with feathers or plant down lining (Higgins *et al*. 2006; NRA 2006), and are used for breeding and roosting (NRA 2007).

The breeding season is an opportunity for BTF populations to recover from losses sustained during the dry season / early wet season (when resource bottlenecks occur as grass seed supply is low). During the breeding season, parents first need to gain sufficient body condition to breed and, then, once the young have hatched, be in a condition in which they can forage for both themselves and their young. Activities

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or events that reduce resource availability during this time may reduce reproductive success. If breeding success is unable to off-set mortality over consecutive years then population declines and, ultimately, local extinctions will occur (Buosi 2011).

4.5 Carmichael population

Over a period of nine years (2010 to 202018), Adani Bravus has commissioned 163 surveys and associated reports assessing the habitat preferences, ecology and population presence of BTF with the Project Area. The most recent BTF surveys undertaken within the Project Area were in March 2015 (Niche 2015a), August 2015 (Niche 2016a), April 2016 (Niche 2016a), October 2016 (ELA 2017a), November 2017 (E2M 2017), and April 2018 (E2M 2018), December 2019 (E2M 2020), June and October-November 2020 (BAAM 2021), and March-April (BAAM in prep.), and have included surveys within the Moray Downs West offset area. Prior to that, surveys had focussed on the mining lease.

Commented [YM13]: Updated to include latest surveys

The methodology adopted in the most recent monitoring surveys consisted of timed fixed point water source watches; habitat searches in the immediate vicinity of the water sources (1 600 km radius); slow drive line transects with defined call playback stations; vegetation and biomass assessments; and opportunistic observations gathered whilst traversing the Project Area. The key findings from the monitoring surveys include:

- Aggregate BTF totals have ranged from 7684 to 1,145 with an average of 480. Dry season surveys have generally yielded the largest aggregate totals (1,145, 846 and 610 in 2015, 2018 and 2016 respectively), although a wet season survey in 2015 yielded records of 600 BTF.
- Surveys to date have focused on the mining lease where the greatest aggregates have been recorded, in particular in the northern area of the mining lease and around Four Mile and Ten Mile Bores. However, large numbers of BTF have also been recorded at Lignum Dam, south of the mining lease.
- The 2016 dry season survey included the greatest survey effort within the Moray Downs West offset area to date where an aggregate total of 151 BTF were recorded from 14 locations.
- Monitoring surveys have identified a strong association between BTF records and vegetation communities dominated by remnant RE 10.5.5a *Eucalyptus melanophloia* open woodland on sand plains (Niche 2016a; ELA 2017a, BAAM 2020). BTF have also been recorded in four other REs (**Table 2**~~Table 2~~).
- A majority of BTF records have been identified during water source watch~~hole~~ surveys with this survey method accounting for 37% of the aggregate total in the October 2016 dry season survey (ELA 2017a).
- Foraging BTF have been predominantly observed in woodland or open woodland dominated by *E. melanophloia* with a mean canopy height of 12 m. Areas used for foraging were characterised by sparse to mid-dense ground cover with a mean ground cover recorded of 40%. Grass species diversity at foraging sites was high with a mean grass species richness of 8. Exotic grass cover is typically less than 5 % (**Appendix E**). The species recorded are typical of grassy woodlands of the bioregion, of which the Project Area supports some high quality examples (Niche 2015a).
- Based on the data available for dry season surveys, it appears that in dry conditions records are concentrated in the central-north and central-south areas of the Project Area where large stretches of suitable habitat area are present and water sources were available at the time of survey (Niche 2016a; ELA 2017a). In particular, large numbers were recorded during the August 2015 BTF monitoring survey in the vicinity of the large dam on the Lignum property (CWAT111), the dam at CWAT03, Four Mile Bore (CWAT99), #2 Dam (CWAT117), the

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Turkey Nest dam at Ten Mile Bore (CWAT01B) and troughs at Lignum (CWAT110B) and Carmichael Bore (CWAT118; Niche 2016a).

- More than ~~A total of~~ 60 BTF nests have been identified during monitoring surveys to date. This includes 15 nests that were identified during the 2018 dry season survey ~~which is the largest number to date~~ (E2M 2018).
- A pair of BTF were observed during the 2016 dry season surveys preparing a nest within the outer-branches of a Silver-leaved Ironbark. This tree was approximately 14m in height and within remnant RE 11.5.5.a.
- Surveys have identified preferred foraging habitat to consist of a grassy understorey with a mosaic of patches of dense grass with open bare patches containing a diversity of native grasses.
- BTF have directly observed foraging on seeds of at least nine grass species as well as the woody shrub *Stylosanthes scabra* within the Project Area (GHD 2012; Niche 2016; ELA 2017a). Another two grasses have been identified as potential foraging species (GHD 2012).

BTF are most regular and most abundant in the northern third and the southern quarter of the Project Area (Error! Reference source not found.~~**Figure 4**~~). The area around Ten Mile Bore (CWAT01B; in the north-west of the mining lease area) appears especially favourable, possibly due to the combination of open grassy *Eucalyptus melanophloia* woodland and the water that it provides. In general, this area has a low shrub cover in the understorey. Areas north of the Carmichael Road in the far west of the Project Area (Four Mile Bore and surrounds) are also favourable, though the numbers of birds are generally lower than around Ten Mile Bore. The Four Mile Bore (CWAT99) area tends to have reasonably extensive patches of understorey shrubs, particularly just north of the Carmichael Road. In addition, large numbers of BTF have been recorded between 2015 and 2018 at a large dam and surrounding habitats on Lignum Station. The floristic composition and structure representative of the area surrounding this large dam is also consistent with the vegetation assemblages shown to support BTF foraging and nesting habitat.

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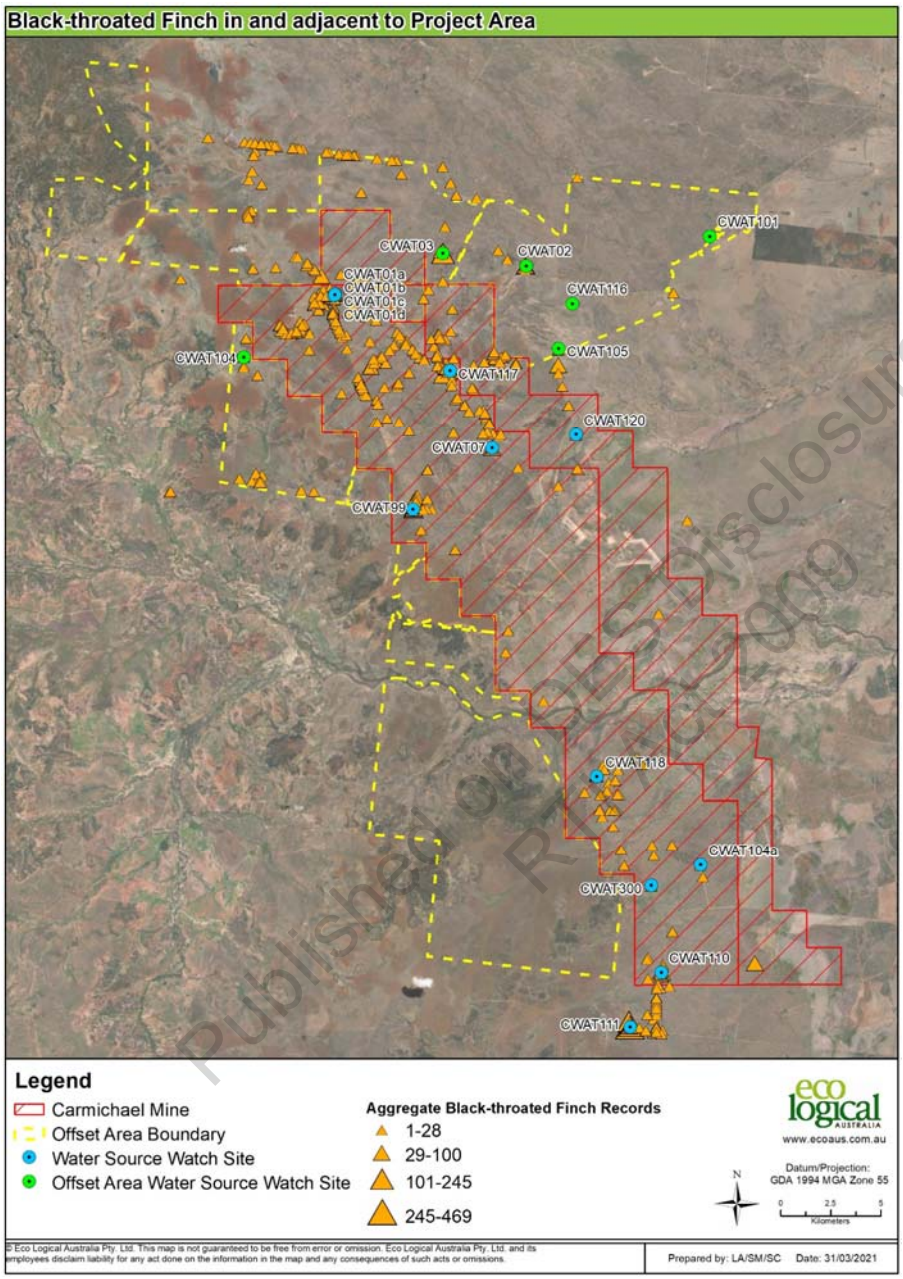

**Figure 4 BTF Records – 2012 to 2016 (GHD 2012, ~~GHD~~ 2013a, ~~GHD~~ 2013b~~;~~, Niche 2015a, ~~Niche~~ 2015b, ~~Niche~~ 2016a, ~~Niche~~ 2016b~~; and~~ ELA 2016~~7a; E2M 2017, 2018, 2020; BAAM 2021~~)

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4.6 Threats, potential direct / indirect project impacts

Threats and potential direct / indirect project impacts that are required to be addressed as they apply to the BTF on the Project Area are:

- threats to the BTF as identified in Table 4~~Table 4~~ and the *National Recovery Plan for the Black-throated Finch Southern Subspecies* (Black-throated Finch Recovery Team, 2007; BTF Recovery Plan)
- direct and indirect project impacts outlined in the EIS (GHD 2012a; Adani 2012)
- matters outlined in Condition 6 of the EPBC Approval (2010/5736).

EPBC Condition 6c) and EA Condition I6d) require details for all impacts and threats MNES to be included in this plan. Known threats to BTF from the *National Recovery Plan for the Black-throated Finch Southern Subspecies* (Black-throated Finch Recovery Team, 2007) are listed in Table 4~~Table 4~~.

The potential sedentary lifestyle of the BTF may make it vulnerable to any loss, disturbance or modification to any of the three key resources of water sources, grass seeds and trees providing suitable nesting habitat (DEWHA 2009). Particularly, the synergistic effects of pastoralism, drought and fire are thought to have the greatest impact on the species by increasing the period of resource shortage and decreasing the quality and availability of breeding habitat (Garnett *et al*. 2011). However, some aspects of pastoralism may also benefit the species (e.g. stocking rates, fire fuel management and artificial water sources).

Other potential threats to the BTF (southern) are illegal trapping, hybridisation with escapees of the northern subspecies, resource bottlenecks associated with drought and changes in land management practices and impacts on seasonal breeding success from cyclonic activity (i.e. destruction of nests; BTF Recovery Team, DECC & NPWS 2007; DoE 2015).

Whilst there is information available helping to identify likely threats to BTF, there are still gaps in the knowledge of how these threats operate, and how they may vary in their impact in different geographical areas that the species inhabits, and how the threats interact with each other.

Impacts resulting directly from the removal of coal include initial clearing of vegetation, removal and storage of topsoil, overburden, coal, rejects and dry tailings, dewatering, and clearing and construction of haul roads. Key impacts on BTF from these activities will be the loss of suitable habitat, direct loss of birds, loss of water sources and uncontrolled fires. As required by Condition 6 of the EPBC approval (2010/5736), potential impacts including area of impact to BTF must be addressed in this plan.

Indirect impacts as a result of clearing and construction for mining and associated activities include weed spread (especially of grass species that are unpalatable to BTF and / or tend to form monocultures), change in species diversity and composition of the grass layer, potential for contamination of water sources and habitat degradation through light spill, noise and dust. Threats, potential direct and indirect project impacts to the BTF are described in detail in the following sections.

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Table 44 BTF threats, potential direct / indirect project impacts and matters required to be addressed by conditions

#	Potential Threat or Impact	Threat identified in the BTF Recovery Plan	Potential direct project impact identified in SEIS	Potential indirect threat or impact identified in SEIS	EPBC Approval, condition 6	Project Phase/s	Description of threat and potential project impact	Impact addressed
1	Vegetation clearing / habitat loss, including fragmentation of key habitat areas and potential fatalities from clearing	Yes	Yes	-	(c)(i)	Construction	Section 4.6.1	**Table 8**
2	Habitat alteration through subsidence	-	Yes	-	-	Operations	Section 4.6.2	**Table 8**
3	Increased exotic pasture and weed invasion of key habitat areas	Yes	-	Yes	(c)(ix)	Construction Operations	Section 4.6.3	**Table 9**
4	Grazing in key habitat areas that changes the ground cover composition	Yes	-	Yes	-	Construction Operations	Section 4.6.4	**Table 9**
5	Wildfire or inappropriate fire management to key habitat areas that changes the ground cover composition	Yes	-	Yes	-	Construction Operations	Section 4.6.5	**Table 9**
6	Feral animal impacts	Yes	-	Yes	-	Construction Operations	Section 4.6.6	**Table 9**
7	Loss or degradation of water sources	Yes	-	Yes	(c)(ii)	Construction Operations	Section 4.6.7	**Table 10**
8	Mine dewatering	-	-	-	(c)(iii)	Operations	Section 4.6.8	**Table 10**
9	Earthworks	-	-	-	(c)(iv)	Construction	Section 4.6.9	**Table 10**
10	Noise and vibration	-	-	-	(c)(v)	Construction	Section 4.6.10	**Table 10**
11	Emissions (including dust)	-	-	-	(c)(vi)	Construction	Section 4.6.11	**Table 10**
12	Light spill and other visual impacts	-	-	-	(c)(vii)	Construction	Section 4.6.12	**Table 10**
13	Stream diversion and flood levees	-	-	-	(c)(vii)	Construction	Section 4.6.13	**Table 10**

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Each of the threats to BTF, potential direct / indirect project impacts and matters required to be addressed by EPBC Approval, Condition 6 are described in detail in the following sections.

4.6.1 #1: Vegetation clearing / habitat loss, including fragmentation of key habitat areas

Clearing of vegetation is the primary threat that would affect the availability of breeding and foraging habitat for the BTF. Habitat loss, fragmentation and degradation are the main threats to the BTF (Garnett & Crowley 2000; Department of the Environment 2005; BTFRT 2007).

The most probable cause of decline from the southern parts of the historic range are overgrazing and habitat clearing (Franklin 1999; Department of the Environment 2005). Declines have been less severe in the northern part of the subspecies range where clearing is not yet as widespread and grazing is predominately by cattle (Garnett & Crowley 2000; BTFRT 2007).

A total of 9,492 ha of identified BTF habitat are proposed to be impacted by vegetation clearing over the life of the Project (CO2 2016). This represents 0.16 percent of the total potential habitat within the Desert Uplands and Brigalow Belt bioregions within which the Project occurs. Details of habitat disturbance across the project stages are summarised in Table 5~~Table 5~~, with the sum of critical, core and marginal habitat disturbance totalling 9,492 ha.

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Table 5~~5~~ Summary of disturbance to BTF habitat at the Mine, off lease and Rail West aspects of the project over Stage 1 and 2 (CO2 2016)

BTF Habitat type	Stage 1 (ha)	Stage 2 (ha)	Total (ha)
Very High (Critical)	4,628	3,080	7,708
High (Core)	726	288	1,014
Marginal	739	31	770
Low	344	634	978

The area of direct impact has been minimised as far as possible throughout the design and development of the mine plan. Through relocation of the out of pit stockpiles, the area of direct impact was reduced by approximately 7,000 ha. This change to the mine plan resulted in an approximately 40% reduction in the potential area of direct impact (GHD, 2013).

High quality BTF habitat within the mining lease area is considered to be located generally in the northern third and the southern quarters of the Project Area (Figure 3~~Figure 3~~ and Error! Reference source not found.~~Figure 4~~). While delivery of the Project will be a staged process, each stage covers large areas of remnant vegetation and will have effects on the behaviour and movements of the local BTF population, reducing areas of suitable habitat.

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Fragmentation of woodland and grassland vegetation associated with the Project development may reduce habitat availability due to the sedentary nature of the BTF as well as causing an alteration in grass species composition or seed availability, affecting the ability of the BTF to find food throughout the seasons. Fragmentation within 5 km of water sources may also reduce habitat availability due to loss of critical resources.

Planning and development of the mine will aim to minimise vegetation clearing in areas considered to be higher value habitat and where high concentrations of BTF occur. The approach of underground mining has been adopted in areas of *Eucalyptus melanophloia* dominant vegetation communities (RE 10.5.5a) and *Eucalyptus brownii* dominant vegetation communities (RE 10.3.6ax1) to minimise impacts to habitat known to be utilised by BTF in the Project Area (Figure 3~~Figure 3~~).

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It is anticipated that approximately 20,230 ha of vegetation will be cleared within the open cut mine footprint which includes open cut mining (including pits, slopes, voids and out of sit spoil dumps) and Infrastructure Area (including water storage, tailings drying cells, diversion drains and levees), of which approximately 9,492 ha is BTF habitat. This clearing is expected to occur over a period of life of open cut pits (approximately 40 years). A mine plan and schedule has been developed for the Project. The mine schedule is broken into 13 time periods, with a mine life of approximately 50 years. Periods 1- 5 are on a yearly basis and periods 6 – 13 are based on 5 years.

As shown in Table 1~~Table 1~~, the area required for clearing of vegetation in the first 10 years of the project life is only approximately 56% of the total disturbance area. As the open cut pit workings proceed towards the midlife (approximately 10-15 years), the rehabilitation of spoil dump areas will commence and hence the net disturbance areas will be reduced.

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Portions of the Project Area will also be cleared for storage of earthen materials such as topsoil, overburden, coal, and tailings. An area of approximately 9,200 ha will be impacted by the placement of top soil and overburden. This area extends from the north-eastern to south-eastern corner of the mine footprint, along its eastern edge, over an area approximately 32 km long by 3 km wide. This will result in some direct loss of BTF habitat, particularly in the north-eastern section of the Project Area where large groups of BTF were recorded (Niche 2015a and Niche 2015b).

The proposed mine plan in relation to BTF habitat and records is shown in Figure 3~~Figure 3~~.

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Management objectives about the threat and impacts include minimising habitat loss and fauna death during vegetation clearing, progressive habitat restoration of disturbed areas and improving awareness of BTF by site personnel. **Table 8** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.2 #2: Habitat alteration through subsidence

Habitat alteration through subsidence as a result of underground mining at Carmichael Mine has the potential to degrade BTF habitat. Subsidence can cause surface movement, cracking and hydrological changes and lead to tree slumping, root damage, vegetation stress and dieback and ultimately alter grass species diversity and composition to those that may be unpalatable to BTF (Adani 2013).

A subsidence assessment was undertaken in 2013 and describes impacts to vegetation and fauna (Adani 2013). The assessment determined:

- Surface movement due to subsidence may lead to areas of destabilisation causing vegetation slumping, tree falls, erosion and root exposure
- Localised variable impacts for mine sites may occur under native vegetation, but were difficult to predict
- Tension cracks may leave soil vulnerable to erosion, leading to damage to root systems
- Impacts to changes in hydrology include loss or changes to the flow and direction through the subsurface, and depression f the surface may lead to water ponding after rain.

The study determined that ponding duration was predicted to range from less than a day to several months. The assessment was based on a typical wet year. The study detailed the subsidence impact area for each environmental value which intersected with the total cumulative layer of subsidence. The study determined the rankings for impacts for assessment of subsidence in Table 6~~Table 6~~.

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Table 6 Ranking of impacts for subsidence, cracking, ponding and infrastructure

Impacts	Ranking of impacts
Subsidence	High: slope change of more than 2% (>5 m) Low: slope change of less than 2% (<5 m)
Cracking	High: > 100 mm (width) Low: < 100 mm (width)
Ponding	High: duration of ponding greater than 2 days Low: duration of ponding less than 2 days
Infrastructure	High: impacted by infrastructure Low: not impacted by infrastructure

The following quantity of subsidence impacts were predicted for BTF habitat (Adani 2013):

- High impact – 163.32 hectares
- Low impact – 6,145.39 hectares
- No impact – 574 hectares.

A management objective under this plan is to minimise habitat alteration through subsidence. **Table 8** describes how the management objective will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.3 #3: Increased exotic pasture and weed invasion of key habitat areas

The main non-native grass present in the Project Area is Buffel Grass which tends to form a monoculture and is associated with a depleted diversity of grasses. This grass dominates cleared areas in the east of the Project Area but is less prevalent in the intact woodlands favoured by BTF in the Project Area. BTF are not known to eat the seeds of Buffel Grass. A monoculture of any species will not provide quality foraging habitat as it reduces the diversity of species whose seeds can collectively provide continuity of supply through the year and during different seasons. The introduced forage legume *Stylosanthes* spp., especially *S. scabra*, is also likely to be detrimental if it becomes a common component of the ground layer of the vegetation, as it has a negative impact on native plant species richness and diversity (DSITIA 2014).

The introduction and / or spread of weeds is acknowledged as a threat to BTF (BTF Recovery Team, DECC & NPWS 2007). Buffel Grass is the primary existing threat to BTF habitat degradation in the Project Area. However other weeds, such as Parthenium, Prickly Acacia and other exotic grasses that are also known from the Project Area (Adani 2015) also have the potential to degrade BTF habitat if allowed to spread through mining activities. Vehicles and machinery also have the potential to import new weeds into the Project Area, with detrimental effects on BTF habitat.

A management objective under this plan is to reduce weed competition within BTF habitat. **Table 9** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.4 #4: Grazing in key habitat areas that changes the ground cover composition

The most probable cause of BTF decline from the southern parts of the historic range are overgrazing and habitat clearing (Franklin 1999; Department of the Environment 2005). Pastoralism was typically concentrated in areas containing suitable habitat for the southern BTF subspecies, such as grassy, riparian woodlands on alluvial plains (NRA 2007). Declines have been less severe in the northern part of

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the subspecies range, where clearing is not yet as widespread and grazing is predominately by cattle (Garnett & Crowley 2000; BTFRT 2007).

BTF are known to persist in pastoral landscapes due to the prevalence of open eucalypt woodlands with suitable water resources and grasses (DEWHA 2009). The abundance of BTF and the viability of their populations in the landscape are influenced by the grazing regime that is in place (DEWHA 2009).

The grazing regime influences the composition and structure of the herbaceous layer of the vegetation. Long-term heavy grazing will selectively remove perennial grass species that are less tolerant of grazing (Buosi 2011). This is likely to increase the prevalence of species such as *Aristida* spp. (Wire grasses), *Cenchrus ciliaris* (Buffel Grass) and *Bothriochloa pertusa* (Indian Bluegrass), annual grasses in general, and unpalatable weeds. Grass species richness is also likely to decrease under long-term heavy grazing.

The Project Area has been predominantly used for cattle grazing. The Project activities do not specifically include grazing, however, parts of the mining leases not being used for the construction and operation of the mine will be used for grazing. Long-term heavy grazing is likely to decrease the grass species richness and increase the prevalence of annual grasses and unpalatable weeds, and therefore decrease habitat quality for BTF (Bousi 2011).

Strategically managed grazing can 'open up' the grass layer, increasing the amount of bare ground on which BTF often forage as well as prevent thickening of a woody shrub layer. Particular cattle grazing regimes can also be used to manipulate the grass layer and manage fire by reducing fuel loads and therefore fire intensity. Grazing by cattle can be used strategically to reduce fuel loads in order to reduce the risk of hot extensive fires.

Sustainable grazing practices will be used in the Project Area as a management tool to manage threats to BTF habitat. Grazing will be used to decrease the abundance and presence of weeds, including Buffel Grass and other exotic pasture grasses, and control fuel loads so as to reduce the risk of an uncontrolled fire.

Grazing management is described in detail in this BTFMP in Section 6.4.1.

A management objective under this plan is to use strategic and sustainable grazing to manipulate the grass layer and manage fire by reducing fuel loads and therefore fire intensity. However, the objective is to also ensure grazing itself does not become a threat. **Table 9** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.5 #5: Wildfire or inappropriate fire management to key habitat areas that changes the ground cover composition

Fire is inevitable in the grassy woodlands of central Queensland and a natural component of these ecosystems. Historically, ignition sources include lightning-strike, low intensity wet season fires, or under traditional indigenous management (DEWHA 2009). Changes in the fire regimes can alter the habitat and food resource availability for the subspecies (Franklin 1999); season-dependent diets have been documented in related finch species such as the Gouldian Finch (*Erythrura gouldiae*), Long-tailed Finch (*Poephila acuticauda*) and Masked Finch (*Poephila personata*; Dostine & Franklin 2002).

Fire frequency can have the biggest impact on ecological function. High frequency, low intensity, patchy fire regimes can be beneficial to BTF by reducing the thickness of the shrub layer (Russel-Smith *et al*. 2001). However, European settlement has caused a shift towards frequent, extensive and high intensity fires in the dry season resulting in large uniform areas being subject to fire (Rechetelo 2015).

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Inappropriate fire regimes can impact on the quality of habitat for the BTF by affecting the production of seeds and the diversity of grass species impacting on food availability. Fire will generally not reduce densities of *Eucalyptus* spp., such as Silver-leaved Ironbark, though it can change canopy structure. Alternatively, fire exclusion can also lead to thickening of woody shrubs, decreasing the quality of BTF habitat.

BTF tend to favour habitat with a sparse cover (less than 5%) of shrubs (**Appendix E**). Short-lived *Acacia* spp. or dense areas of *Carissa ovata* and / *or C. lanceolata* will suppress the grass layer and grazing, and an altered fire regime will also increase woody thickening, diminishing both the forage supply and the quality of foraging habitat (Ludwig 2000; DSITIA 2014).

BTF require open patches between grass tussocks to feed on fallen grass seed. If the understorey is shrubby, the supply of grass seeds is likely to be diminished. Extensive areas of dense shrubs are likely to be detrimental to the species as the shrubs suppress grass growth and the exclusion of fire can facilitate the development of these areas (Russel-Smith *et al*. 2001). Small patches of shrubs and low trees may be used to rest and for shelter.

Fires in woodlands of the type that occur in the Project Area are fuelled principally by grass biomass rather than by woody material. Fire intensity will be greater with high fuel biomass, continuity of the fuel layer, a high degree of curing (drying) of the grassy fuel and ambient conditions, including high temperatures, low humidity and high wind speeds. Lower intensity fires will occur when fuel biomass is low and / or discontinuous, fuel moisture levels are high, ambient temperatures and wind speeds are low and atmospheric humidity is high.

Fire frequency, scale and intensity may also impact on habitat quality for BTF through numerous mechanisms. Large uncontrolled wildfires have the potential to destroy large areas of BTF habitat with consequential long recovery times. Fire frequency can also affect BTF habitat with inappropriate fire regimes impacting on the quality by affecting the production of seeds and the diversity of grass species and food availability (in the case of overly frequent fires) or by causing thickening of woody shrubs where fire is excluded from the landscape.

Management objectives under this plan are to reduce the risk of bushfire ignition, maintain a mosaic of fire history in BTF habitat and reduce the risk of bushfire spread. **Table 9** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.6 #6: Feral animal impacts

Domestic stock and rabbits can degrade habitat through grazing, trampling and altering the fuel loads (Franklin 1999; Franklin *et al*., 2005; Kutt & Woinarski 2007). Woodland bird communities often feed in mixed flocks which is a predator vigilance and avoidance behaviour (Vanderduys 2012; Adani 2012). Flocks may be reduced in size when the abundance of seeding grasses is low, and as a consequence can increase predation on bird species through loss of predator vigilance when feeding (Garnett *et al*. 2011).

Invasive animals are known to occur in the Brigalow Belt North and Desert Uplands bioregions. Feral cats (*Felis catus*), were recorded in the Project Area in 2010 and 2011 and are likely to prey on BTF (GHD 2012a). There are currently no data on cat presence or predation rates within Moray Downs West or the Project Area. Studies near Townsville found that nests were abandoned or became inactive when they were destroyed by predators (NRA 2005 in DoE 2016). Foraging and watering areas may also be disturbed by wallowing and uprooting of feral pigs.

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Management objectives under this plan are to reduce habitat degradation from grazing by introduced herbivores, minimise predation risk by invasive mammals and use adaptive management of weed and pest controls to minimise threats to BTF and their habitat. **Table 9** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.7 #7: Loss or degradation of water sources

BTF need to drink water on at least a daily basis and drink more frequently during the drier times of the year. The importance of water to BTF is highlighted by the fact that they typically nest and breed near water. The species is thought to undertake local movements in response to rainfall patterns, with some populations utilising seasonally (wet season) available water to access breeding grounds then contracting back to permanent water sources during the dry season (Peter Buosi, pers obs.).

Activities that reduce the availability (location and duration) of water or detrimentally alter water quality in areas of BTF habitat may negatively impact on the species. This impact will be greatest in breeding areas and / or dry season refugia. The availability of vegetation in the immediate vicinity of the water is important, to provide shelter for perching prior to drinking, and trees through which they can travel to and from the water are important. Pressures on the availability of water will be most pronounced during periods of drought. Conversely, the creation of water sources in certain parts of the landscape may create habitat for the BTF.

Numerous occurrences of BTF drinking from water troughs were recorded within the Project Area during surveys completed in the period 2013 to 2018 (GHD 2012; Niche 2015a and 2015b, ELA 2017a, E2M 2018). Vegetation in close proximity to water sources is important as it provides shelter for birds (Buosi 2011). It is likely that additional anthropogenic water sources in BTF habitat will assist the species in drought conditions by providing a more reliable and permanent source of water.

Within areas to be open cut mined, existing natural and artificial surface water sources will be lost. There are six dams within the Project Area where BTF have been identified (Niche 2015a, Niche 2015b, Niche 2015c and ELA 2017a) that will be lost due mining activities (~~Figure 3~~**Figure 3**). BTF have been recorded consistently utilising some of these water sources, in particular #1 Dam and #2 Dam. Removal of these permanent water sources from the Project Area will decrease the overall availability of water for the BTF across the broader landscape.

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Availability of drinking water in proximity to good quality habitat is critical for BTF persistence. Contamination of potential BTF water resources surrounding the mine from sources such as hydrocarbon leaks or spills, spoil disposal, release of sediments through clearing and earthworks, or draining of low quality water from existing farm dams, could impact on the species. These impacts are unlikely to occur due to the alignment and location of mining activities and the implementation of adequate control measures. Such changes to water quality may reduce the suitability of aquatic and riparian habitats for terrestrial species.

Management objectives under this plan are to:

- ensure water quality in known BTF water sources outside disturbance footprint remain within acceptable limits
- reduce degradation of suitable water sources
- protect environmental values within waterways of the receiving environment
- minimise siltation of water resources
- maintain access to water, with no net loss of suitable permanent water sources

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- reduce the risk of contamination of BTF habitat by chemicals, fuel, heavy metals

Table 10 describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.8 #8: Mine dewatering

Mine dewatering has the potential to negatively impact on groundwater-fed BTF watering sources. Drawdown may reduce the temporal and spatial availability of water by restricting or removing the base flow that persists in the Carmichael River during the dry season or increase the low flow periods as well as impacting spring wetland areas which BTF may use (ELA, 2015b). However, it should be noted that BTF have not been observed to utilise the Carmichael River (Error! Reference source not found.~~Figure 4~~).

A management objective under this plan is to manage the impacts of mine dewatering. **Table 10** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.9 #9: Earthworks

Earthworks carried out as a part of mine construction will lead to increased exposure to light, noise, dust, vehicles and people. Animals may also become more vulnerable to predation, because of increased light making it easier for predators to locate prey or noise levels making it harder for prey to detect approaching predators (Adani 2012).

Increased exposure to light, noise, dust, vehicles and people are dealt with in other sections. The other possible impact to BTF as a result of earthworks are the mortality and injury of individuals due to machinery strike.

Vehicles and machinery used to undertake land clearing have the potential to lead to direct mortality of fauna in the event that individuals are struck. Those animals that are unable to disperse away from areas under active clearing are also particularly susceptible to injury or death. This includes amphibians, reptiles, small ground-dwelling mammals, arboreal mammals and nocturnal species that are inactive during daylight hours.

Other potential causes of mortality include animals becoming trapped in excavations, and carrion eaters being struck when feeding on road kill. However, as the BTF are able to disperse away from areas subject to earthworks, fauna mortality and injury to individuals due to machinery strike is not expected to be a common occurrence (Adani 2012).

A management objective under this plan is to minimise the risk of light vehicle and machinery strike during earthworks and operations. **Table 10** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.10#10: Noise and vibration

As the Project Area is currently exposed to some disturbance as a working cattle property, the BTF that occur there exhibit a degree of disturbance tolerance. BTF are known to inhabit areas exposed to anthropogenic disturbance (peri-urban Townsville including habitat directly adjacent to military training areas and numerous towns in central Queensland).

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The BTF may exhibit initial fright behaviour in response to the increased intensity of disturbance at the Project Area, and will either adapt to the disturbance levels, or move away from the areas of activity into similar habitat that is extensively available in the adjacent landscape. Dispersal will be facilitated by active management and enhancement of habitats occurring onsite (outside the mine footprint) and offsite (offset areas; Adani 2012).

The project will use standard construction equipment, general trade equipment and specialised equipment as required. Some blasting will be required to prepare overburden for removal and also coal extraction (Adani 2012).

Noise and vibration disturbance from coal transport may reduce the quality of resources for BTF, both within the Project Area and in adjacent areas. Noise from mining operations may increase BTF stress and flushing responses, change foraging behaviours, reduce reproductive success and communication (Ortega 2012).

A management objective under this plan is to minimise habitat modification as a result of noise and vibration. **Table 10** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.11#11: Emissions (including dust)

Vegetation clearing has the potential to facilitate erosion (by water and wind). This can have a localised impact on species and habitat suitability by reducing the quality and abundance of refuges, microhabitats and food availability through the smothering of native vegetation with sediment.

Earthworks will result in dust emissions. Excessive dust settling on vegetation could also suppress vegetation growth by limiting the photosynthesis potential of plants in close proximity to the construction area (Nanos and Ilias, 2007). Plants with dust on leaves may also be less palatable as a food source for animals. Dust deposition associated with earthwork activities will generally occur relatively close to areas of disturbance and hence, plants within 50 m – 100 m of construction activities may be affected by dust. As construction activities are temporary, effects will be short lived, and rainfall will generally remove dust from plants (Adani 2012).

Dust emissions from coal transport may reduce the quality of resources for BTF, both within the Project Area and in adjacent areas. Dust may also affect plant health and palatability, particularly for native grasses within foraging habitat.

A management objective under this plan is to minimise emissions, particularly dusts. **Table 10** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.12#12: Light spill and other visual impacts

Development of the project will necessitate the installation of lighting for safety and security of operations as the proposed mine will operate 24 hours per day. Impacts from lighting will involve static floodlights associated with mine operations, lighting around the mine infrastructure area, workshops and ancillary buildings, vehicle lights moving around the site. Artificial night lighting levels are expected to be very low indeed, if present at all, and this is considered to be an impact of minor significance on fauna generally, including the BTF (Adani 2012).

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A management objective under this plan is to minimise light spill and other visual impacts. **Table 10** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

4.6.13 #13: Stream diversion and flood levees

Existing hydrology will be altered as a result of the mine operations through realignment of watercourses as well as removal of some existing farm dams and cattle troughs. Diversion drains around the perimeter of the mine site as well as areas of ponding and drainage management within the subsidence area provide water sources. The provision and security of surface water in those potential habitat areas may provide additional localised access to drinking water for the subspecies.

A management objective under this plan is to reduce the impact of stream diversion and flood levees. **Table 10** describes how the management objectives will be met, including performance criteria, management actions, monitoring, triggers for adaptive management and corrective actions.

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5 Adaptive Management Framework

This section describes the adaptive management framework that will be applied to the management of BTF, as originally outlined in the BTF Management Plan prepared during the environmental impact assessment process (Adani 2014).

Adaptive management is a process that deals with uncertainty and incomplete knowledge by using systematic monitoring to reduce uncertainty and improve management actions over time. The monitoring program that will provide data to inform and improve the management actions in this plan are outlined in **Section 7** and **Appendix C**. In general, the monitoring framework will:

- Address key questions regarding BTF ecology and distribution. The new knowledge will be systematically reviewed and used to refine the monitoring and management of BTF in the Project Area. Improved knowledge about BTF ecology and distribution will allow understanding of the potential project impacts to be further refined.
- Employ appropriate regular review and analysis of the monitoring data to refine the monitoring program and refine management actions.

Adaptive management emphasises the iterative feedback between the implementation of management actions and the assessment of their effectiveness via continuous improvement of knowledge via monitoring and evaluation of the monitoring data (Walsh *et al*. 2012). In particular, the results of the BTF Research Program and monitoring completed under the BTF Management Plan will provide a basis for review of the management actions, and ensure that mitigation measures are appropriately targeted and based on the best available science.

The key management actions are outlined in **Section 6**. Management actions, and the monitoring that provides information for the management, will be based largely on the main themes within **Section 6**, and may be expanded as new knowledge of BTF at the Project Area becomes available. Specific management objectives, performance criteria, management actions, monitoring, triggers for adaptive management, and corrective actions have been established (see **Table 8** to **Table 10**), consistent with the framework for adaptive management outlined in **Figure 5**~~**Figure 5**~~. The monitoring program will inform the management actions over time, which in turn will help develop more effective monitoring programs. All of these steps will allow ongoing revision and improvement of the BTF Management Plan.

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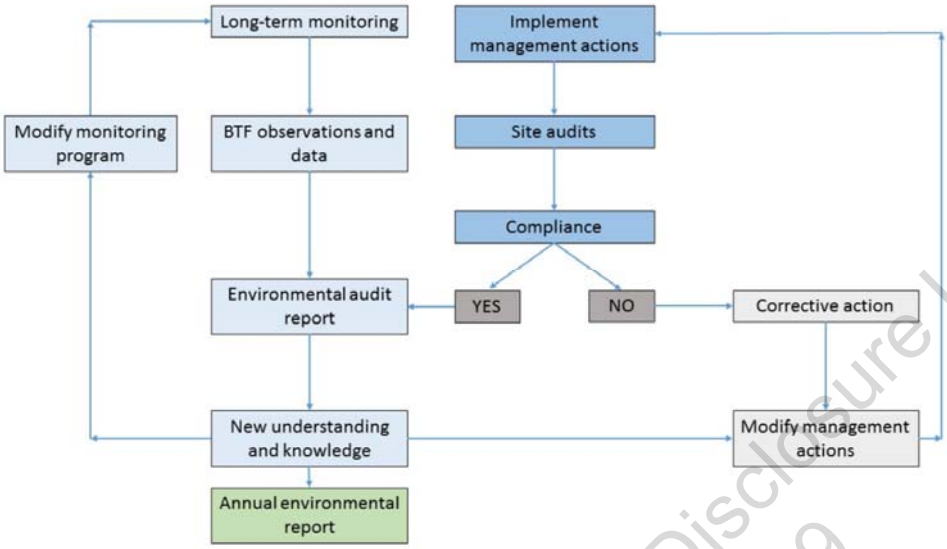

Figure 5 Adaptive management framework

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6 Mitigation and Management Measures

The mitigation and management measures are required under EPBC conditions 6d) to f) and EA condition I6e) and have been developed in accordance with relevant guidance documents and best available knowledge regarding BTF ecology and habitat use within the Project Area.

An adaptive management approach will also be implemented where:

- monitoring identifies that mitigation and management measures are not achieving the performance criteria
- in response to triggers identified by the monitoring process and from information gathered in the field from the pre-clearance survey and fauna spotter-catchers, and
- implementation of the BTF Research Program.

Measures intended to mitigate and / or manage the potential impacts to BTF are described in **Section 6.1**. As per EPBC Act approval condition 6j) and EA condition I6k), monitoring will be undertaken by a suitably qualified person (see **Section 9.3** for details), to determine the effectiveness of mitigation measures. This process is referred to as the adaptive management loop. The results of monitoring, and associated assessments of the effectiveness of mitigation measures, will be reported to DAWeE and DES.

6.1 Mitigation measures

Mitigation measures described are either those specific to BTF or for other ecological values of significance (i.e. TECs and other threatened species) of relevance to the BTF occurring in the Project Area. Generic mitigation measures are included as they provide an important approach to whole of ecosystem protection, which will also enable management of impacts to specific species, such as BTF.

Pre-clearance surveys are a collective mitigation measure proposed across this and other management plans as the surveys will provide information on the composition and area of vegetation and habitat to be disturbed prior to construction works. These surveys provide opportunities for avoidance of further impacts, as well as enabling accurate determination of disturbance areas to ensure these are not greater than approved disturbance limits.

A description of the generic mitigation measures that are applicable to the management of BTF is provided in Table 7~~Table 7~~.

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Table 7~~7~~ Generic mitigation measures to be implemented across the Project Area

Commented [YM17]: Table expanded to include timing and performance criteria per DES comment 4b.

Objectives	Actions	Timing	Performance Criteria
Educate site personnel and contractors about the presence and identification of threatened species, and maintain awareness during construction and operations.	**Education** • Induction program for site personnel and contractors about threatened species, their habitats and identification. • Identification posters in prominent work locations to maintain awareness. • Implement sound land management practices.	At onboarding of staff and contractors as part of the induction process. Maintain ongoing awareness throughout project.	Completion of induction program by all staff and contractors including information on presence and identification of threatened species. Absence of impacts to threatened species and communities that are the result of a lack of awareness.
Reduce the magnitude of disturbance to threatened communities and threatened species within the Project Area.	• There will be some discretion in the precise location of some infrastructure. Where it can be accommodated in the mining plan, infrastructure will be located in areas which avoid disturbance to threatened species habitat.	Ongoing, as part of the design aspect of project stages, and selection of areas to be disturbed.	Areas to be disturbed were selectively located in areas with no or minimal threatened species habitat, in preference to areas of habitat, where practical.
Determine the environmental condition, immediately prior to construction activities. Monitor compliance with approval conditions as required by Condition 6g) of EPBC2010/5736.	**Undertake pre-clearance surveys** • Conduct surveys of vegetation and threatened species habitat extent and condition, prior to the commencement of any clearing or disturbance activities. • Define the area (hectares) of threatened ecological communities and threatened species habitat to be cleared.	Prior to the commencement of clearing activities.	Pre-clearance surveys completed prior to the disturbance of threatened species habitat.
Minimise impacts of construction on threatened communities and species.	**Use licensed fauna spotter-catchers during vegetation clearing** • Fauna to be recorded and translocated to suitable habitat adjacent to the disturbance area, where practical. Fauna spotter-catchers are qualified professionals trained in competencies to handle animals, minimise capture myopathy and shock in birds and reptiles. Under the *Nature Conservation Act 1992* (Qld), fauna spotter-catchers hold permits for dispersing, removing and relocating wildlife. • Fauna deaths and injuries to be recorded, and managed in accordance with relevant guidelines.	Prior to and during clearing activities.	Fauna spotter-catchers engaged for all vegetation clearing.

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Objectives	Actions	Timing	Performance Criteria
Minimise impacts on threatened communities and species, and their habitat. Promote post-construction recovery of the natural ecosystem.	**Rehabilitate all temporarily disturbed areas (e.g. lay down areas and turning circles)** • All temporarily disturbed areas will be rehabilitated as soon as possible following completion of use, where such activity does not compromise the ongoing operation of the project (e.g. increase bushfire risk). • The timing of rehabilitation actions after disturbance will be outlined in the ~~Plan of Operations~~Estimated Rehabilitation Cost (ERC), developed in accordance with the EA. The ongoing program of rehabilitation works will be developed on the basis of environmental objectives, local site conditions and logistical requirements.	As soon as possible following completion of use, as outlined in the ERC.	Rehabilitation of disturbed areas occurs in a timely manner, in accordance with the ERC.
No net loss of threatened communities and species. Maintain the integrity of ecological habitats within the region.	**Implement environmental offsets (for selected species and ecological communities)** • Offset the habitat values of threatened ecological communities and used by threatened species, within the Project Area by securing ecologically equivalent areas elsewhere. • Monitor BTF habitat values through annual groundcover assessments, ~~during~~ to be completed no later than the end of May each year, to maintain and enhance BTF habitat within the Mining Lease. • Maintain BTF habitat values in non-mined areas	Offsets to occur as per the Offset Area Management Plan and Biodiversity Offsets Strategy. BTF habitat values be assessed on an annual basis.	Offsets established as outlined in the Offset Area Management Plan and Biodiversity Offsets Strategy. BTF habitat values in non-mined areas are maintained.
Reduce the impact of lighting on threatened species during construction and operation.	**Manage light pollution** • Use directional lighting and strategic timing and placement of lights to minimise light spill into known threatened species habitat and TECs.	During construction and operations.	No evidence of disturbance to threatened species habitat and TECs as a result of light pollution.

Commented [YM18]: Changed to provide flexibility for climatic variables.

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The results of all mitigation actions will be recorded as specified in approval condition 6g) of EPBC2010/5736. Further details of such reporting are provided in **Section 9**. A register of all commitments arising from the management planning process is provided in **Section 10**.

Tables 8 to **10** summarise the proposed mitigation and management measures specific to BTF which will be implemented during planning, pre-construction, construction, operation and decommissioning phases of the Project that address potential impacts specific to BTF. They include management actions for Ten Mile Bore, and the management of water sources. Within the approved level of disturbance, if there are management practices that can be taken to avoid, or reduce impacts to BTF and their habitat, such practices will be implemented.

6.2 Impact mitigation and management

In accordance with EPBC conditions 6d) to f) and EA condition I6e), measures will be implemented to mitigate and manage impacts to BTF during the Project.

To address the impacts to important BTF habitat in the northern section of the Project Area, ~~Adani~~ Bravus altered the mine plan during the EIS process to access coal reserves in this northern section via underground mining, thereby reducing the clearing requirements in this area. Associated mining infrastructure and disturbances (such as linear infrastructure, spoil and / or stockpiling) have been located in as many locations as possible where there is no confirmed BTF habitat. In particular, this applies to the northern section of the Project Area where stockpiling and chemical storage will be within and / or adjoining locations where BTF have been recorded.

Connectivity between the western and eastern parts of the Moray Downs West Offset Area will be maintained through the implementation of this BTF MP across offset areas and non-mined lease areas. This includes the area of ML70506 upon which no mining activities have been assessed or planned to occur.

Mitigation measures associated with clearing will be implemented strategically in accordance with the staging of Project activities (**Section 2.2**). Prior to any clearing commencing, clearing requirements for mine and other infrastructure will be reviewed in order to identify opportunities to reduce clearing of native vegetation and utilise existing cleared areas wherever possible. Spoil and topsoil stockpiling will be located in as many areas where BTF have not been recorded or within known or potential habitat.

Threatened species and vegetation mapping will be consulted prior to planning spoil pile placement to minimise the potential for impacts to BTF habitat. Rehabilitation of BTF habitat will occur in areas that are subject to temporary disturbance, and in areas that are no longer required for mining operations. Offsets are in place for areas of BTF habitat that can't be rehabilitated (see **Section 6.5**). Management activities for areas subject to offsets are described in the OAMP, and include the provision of water supplies to support BTF. At the completion of the Project, parts of the Project Area are likely to be utilised for pastoral activities, providing similar habitat values for BTF that existed prior to the Project commencing, including the provision of water for cattle grazing.

6.3 Impact minimisation measures

In accordance with EPBC conditions 6d) to f) and EA condition I6e), measures will be implemented to minimise impacts to BTF during the Project.

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6.3.1 Vegetation clearing protocols

Planning phase – whole-of-project staging

The development of the Project will be a staged process throughout the life of the Project and is expected to result in impacts of up to 9,492 ha of BTF habitat (CO2 2016). In order to mitigate these impacts, the development and clearing will be staged (see **Table 1**~~Table 1~~ for different Project stages causing disturbance).

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Generally, clearing will commence from the middle of the Project Area which largely consists of non-remnant vegetation that does not provide habitat for BTF, before gradually progressing towards the north and south, respectively. Clearing of important habitat located in the northern third (i.e. between Four Mile Bore and Ten Mile Bore) and the southern quarter (south from Carmichael Bore) of the Project Area, will occur as late as possible during the construction and operational phases. The rationale behind this staged approach is:

- The existing breeding population of BTF within the Project Area will be protected for as long as possible, allowing for ongoing recovery and redistribution of the population;
- Clearing disturbed areas first will allow birds to remain in areas of good habitat rather than be directed into the mid-sections of the Project Area, where habitats are less favourable; and
- Staging will allow time for BTF habitat in the surrounding offset areas to improve such that birds may be attracted to these areas prior to clearing impacts occurring and / or have areas of suitable habitat to move into during construction.

Clearing will be minimised as far as practicable during the wet season, which is the known breeding season for BTF. The wet season is nominally December to March each year, and ~~Adani~~ Bravus will use its best endeavours to plan and implement clearing activities to occur outside the breeding season. However, the actual timing of the wet season will be determined on an annual basis depending on local weather conditions.

Management measures to achieve the clearing outcome will be through long term planning process according to the stages of mine plan that will allow these timing restrictions to be adhered to. However, if operational constraints (particularly in the early stages of the mine construction) necessitate clearing during the wet season, additional measures will be required and will be implemented during the pre-construction phase (see below).

Pre-construction phase – stage scale planning for vegetation clearing

A range of measures will be implemented prior to vegetation clearing for each stage, in order to further avoid and / or reduce impacts to BTF. Collectively, these measures are aimed at encouraging birds still present in the clearing zone to leave the area without human intervention.

A clearing plan will be developed for each stage. The development of this plan will require up-to-date information on the habitat quality and utilisation of the area by BTF. This information will be gathered during baseline and pre-clearance surveys, to be undertaken by suitably qualified ecologists, with demonstrated experience in the survey and management of BTF. Additional information gathered during the monitoring and research components of the Project must also be utilised.

The clearing plan for each stage will be developed and must consider/include:

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- Mapping depicting disturbed areas, vegetated areas that are not potential BTF habitat, potential BTF habitat, areas where there have been sightings of BTF within the last five years, and areas showing breeding records.
- Structuring works in a way that specifies daily clearing extents within BTF habitats to allow BTF to fly to other habitat areas while habitat is cleared. Currently, it is conservatively assumed that BTF are able to travel at least 0.5 km in one day to escape clearing activities (BTF may travel several km in a day to access water). However these clearing limits will need to be tested as part of the on-going monitoring and adaptive management process.
- Structuring clearing so that wherever possible habitat connectivity can be maintained by providing stepping stones of habitat the BTF can travel through when escaping the clearing front.
- Site plans and maps depicting exclusion zones for vegetation clearance and machinery within areas of BTF habitat. Access to these zones must be restricted in order to prevent any unnecessary damage to BTF habitat.

Prior to the commencement of site works, any conditions listed in the "Permit to Disturb" must be implemented (e.g. clearing extents clearly marked and trees / areas requiring protection clearly marked).

Construction phase – clearing

Vegetation clearing will be undertaken in accordance with the clearing plan for each stage. All BTF habitat clearing operations will be monitored for compliance by suitably qualified fauna spotter-catchers during clearing activities (see below).

6.3.2 Fauna spotter-catcher

The use of fauna spotter-catchers prior to and during all vegetation clearing activities within BTF habitat will be implemented to ensure impacts on BTF are minimised. This role is not specific to the BTF and will be implemented in accordance with the requirements of the overarching Species Management Plan and relevant approvals to protect fauna during clearing activities. The fauna spotter-catcher will instruct contractors on the most appropriate technique for felling habitat trees to minimise harm to undetected fauna and also inspect felled vegetation for fauna and relocate individuals as required.

If clearing is to occur during the wet season (to be avoided where possible), the role of the fauna spotter-catcher with respect to the BTF is to:

- Identify active nests not picked up by the pre-clearance surveys;
- Assess whether breeding places (i.e. nests) contain eggs or young;
- Establish and implement relocation requirements.

The fauna spotter-catcher will utilise expert advice from a BTF specialist to assist in the development of fauna handling/relocation plans to ensure consideration of life-cycle or ecological constraints. In circumstances where avoidance has been assessed but impacts on an isolated nest are unavoidable during the clearing process, with relevant approval from authorities for tampering with the breeding place of a threatened species, the fauna spotter-catcher would be responsible for removing the nest and placing young / eggs into care in captivity.

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6.3.3 Summary of mitigation and management measures

The threats to the BTF relevant to the Project and potential project impacts and actions minimising impacts to the BTF are summarised in **Tables 8 to 10**. The tables address the following:

- management objectives
- performance criteria
- management actions
- monitoring
- triggers for adaptive management and corrective actions
- specific, measurable and time-bound corrective actions.

Baseline and impact monitoring measures will be implemented, including control and impact sites to be monitored throughout the life of the Project. Monitoring will provide sufficient data to quantify likely impacts, already approved, resulting from mining operations to set habitat management goals.

When adaptive management and corrective actions are triggered, the first step is to investigate the cause of the trigger. The investigation will be carried out as soon as possible, but within 2 days, after the trigger is identified and will focus on the reasons and causes of the triggers, and identify appropriate corrective actions in a timely way. The investigation will be:

- Carried out in accordance with the Environmental Management System (certified ISO 14001)
- Assessing actual or potential, short and long term impacts
- Determining the root and contributing causes
- Recording details on approved templates
- Identifying appropriate corrective actions, as per the last column in **Tables 8 to 10**. Corrective actions will be implemented in a timely manner (as soon as is practically possible), consistent with the circumstances that have given rise to the trigger. Notification of relevant managing agencies and a revision to the BOS will be proposed if an increased impact cannot be avoided.

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Table 88 Management objectives, performance criteria, adaptive management triggers and corrective actions – Vegetation clearing / habitat loss, including fragmentation of key habitat areas

Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
Minimise habitat loss	No unnecessary clearing	No-go zones for vegetation clearance and machinery will be developed for areas of BTF habitat outside of the clearing footprint and will be depicted on site plans and maps to restrict access and prevent unapproved clearing. Prior to the commencement of site works, any conditions listed in the "Permit to Disturb" must be implemented (e.g. clearing extents clearly marked, trees/areas requiring protection clearly marked).	Regular site inspections in accordance with the Environmental Management Plan and System. Close out report for the Permit to Disturb process includes check for compliance with: • clearing only in the approved footprint • no clearing in the no-go zone/s.	Clearing in BTF habitat: • outside approved clearing footprint • in no-go zone/s • without a "Permit to Disturb" issued	The appropriate corrective actions will be implemented and may include*: • When clearing outside approved clearing footprint, no go zones or without a "Permit to Disturb Permit" issued, o Environment Manager ensure that all clearing activities cease immediately o Area assessed by a suitably qualified ecologist/person within 15 business days of investigation o Reviewing and modifying "Permit to Disturb" process and no-go zone identification and communication protocols o Rehabilitation of the impacted area. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
	Clearing of BTF habitat does not exceed 9,492 ha as approved in EIS and referral documentation	Prior to the commencement of site works, any conditions listed in the "Permit to Disturb" must be implemented (e.g. clearing extents clearly marked, trees/areas requiring protection clearly marked).	Monitoring of vegetation proposed to be cleared by the Environmental Manager, via the Permit to Disturb process. Ongoing monitoring and reporting on the amount of BTF habitat that is cleared annually, and predicted to be cleared.	Reach 75% of the clearing BTF habitat approved area for stage 1	The trigger of reaching 75% of clearing BTF habitat does not require correction as the clearing is approved to be carried out, however the following actions will be triggered (within 30 days): • Contact with nominated representatives from compliance teams of ~~DoE~~ DAWE and DES under the EPBC and Environmental Protection Acts when clearing reaches 75% of approved area for stage 1 • Provision of maps and data showing clearing in approved impact areas, and calculations showing quantity of approved clearing • Provide advice demonstrating how the clearing will not exceed approved limits. If the assessment finds that the actual area of impact differs from the area of impact as detailed in the BOS, within 30 days of this determination the BOS will be revised and submitted to the Department. If an increased offset is required by the revised BOS, this will be delivered within 12 months of the revised BOS being submitted to the Department.

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Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
	Minimise habitat fragmentation	The area of direct impact has been minimised as far as possible throughout the design and development of the mine plan. In 2012, the relocation of the out of pit stockpiles was reduced by approximately 7,000 ha. This change to the mine plan resulted in approximately 40 percent reduction in the potential area of direct impact. Where practical, spoil and / or stockpiling will be preferentially located in areas of previously disturbed environment or areas of future disturbance, rather than within BTF habitat. The assessment of practicality will consider issues such as the proximity and accessibility of alternative areas, safety of personnel and logistical requirements of transporting spoil. Manage non-mined and offset areas to maintain and improve BTF habitat values. This work will be guided by results from annual vegetation assessments, annual BTF surveys and the BTF Research Program. Connectivity between the western and eastern parts of the Moray Downs West Offset Area will be maintained through the implementation of this BTF MP across offset areas and non-mined lease areas. This includes the area of ML70506 upon which no mining activities have been assessed or planned to occur. Ensure the pre-disturbance condition of BTF habitat adjacent to the development is maintained.	Monitoring of vegetation proposed to be cleared by the Environmental Manager, via the Permit to Disturb process. Annual vegetation assessments, annual BTF surveys and the BTF Research Program.	Direct impacts occur outside of approved impact areas particularly in non-mined areas.	The appropriate corrective actions will be implemented and may include*: • Impacts assessed by a suitably qualified ecologist/person within 15 business days of investigation • Reviewing and modifying “Permit to Disturb” process and no-go zone identification and communication protocols • Review of activities with respect to potential direct and indirect impacts outside of approved areas. • Rehabilitation of the impacted area. If the assessment finds that the actual area of impact differs from the area of impact as detailed in the BOS, within 30 days of this determination the BOS will be revised and submitted to the Department. If an increased offset is required by the revised BOS, this will be delivered within 12 months of the revised BOS being submitted to the Department. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
	Minimise the impacts of habitat alteration through subsidence	Ameliorate impacts of ponding and cracking in subsidence areas to mitigate any negative impacts on BTF habitat values, in accordance with the Subsidence Management Plan. Subsidence is not predicted to potentially impact BTF habitat values until year 20 of mining operations. This plan will be updated with additional detail about control and impact sites to be monitored throughout the life of the Project, when the Subsidence Management Plan has been updated. Establish exclusion zones and remove cattle from underground mining footprint, when subsidence is predicted. Construct fences outside subsidence footprint to keep cattle from the subsided area.	Develop a numerical model based on the geological data to refine predicted cracking and subsidence impacts. Modelling to inform detailed monitoring methodologies. Use of baseline habitat quality for comparison during monitoring, including control monitoring points. Conduct annual monitoring of the condition of BTF habitat in subsidence areas, using methodologies identified in the Subsidence Management Plan.	Impacts to BTF habitat, including ponding and cracking, found in subsidence areas. Weeds found in subsidence cracking and ponding areas.	The appropriate corrective actions will commence within 2 days of identification of cause and may include*: • Reviewing and redesigning the monitoring program, increasing monitoring events, changing monitoring methodology • Rectifying impacts (e.g. pumping out ponds) • Re designing and implementing and water diversions • Actively control weeds to maintain and enhance BTF habitat values in the cracking and ponding areas. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
Minimise fauna death during vegetation clearing	BTF living near the clearance zone have time to move out of the areas of disturbance without human intervention	Stages will be structured in a way that limits clearing extents to allow BTF to fly to other habitat areas when habitat is cleared. Clearing limits are untested and will be developed based on the likely ability of the BTF to travel a conservative minimum of 0.5 km in one day to escape clearing impacts to where suitable habitat is present in adjoining areas to be retained. The overall direction of sequential vegetation clearance will be as much as possible away from threatening processes (i.e. mining operations/roads cleared land) to direct fauna towards areas of retained native vegetation. The general progress of clearance will be towards habitat to be retained in the north and/or west of the Project Area for areas north of the Carmichael River and towards habitat to be retained in the south and/or west of the Project Area for areas south of the Carmichael River.	Record the areas of occupancy for all BTF prior to clearing activities that occur within the Project Area, adjacent to Project Area and areas for suitable BTF habitat rehabilitation. Confirm and identify the spatial extent and condition of BTF habitat to be disturbed prior to any clearing or disturbance commencing, through pre-clearance surveys. BTF surveys will focus on confirming species presence throughout the Project Area, identifying species presence in proximity, but outside (adjacent to) Project Area and identifying areas of potential rehabilitation for BTF habitat values inside the Project Area, but outside the disturbance footprint. Record observed BTF fatality, including suspected nests / eggs of BTF.	• Insufficient adjacent habitat within 500m from clearance areas to allow refuge from impacts. • Fauna spotter-catchers and monitoring results indicating that BTF are not able to move away from cleared areas in sufficient time. • BTF death or injury during vegetation clearing.	The appropriate corrective actions will commence within 2 days of identification of cause and may include*: • Redesign of activities associated with observed mortality to avoid causal and contributing factors • Re-planning / adjusting clearing progression timeframes and locations with respect to refuge availability • Third party review by suitably qualified ecologist/person of management and monitoring actions to provide input on effectiveness • Modifying the strategic grazing regime, or fire management measures, to better support enhancement of values • Divert clearing to other habitat to provide time for BTF to adjust • Re-evaluate the suitability of the relevant management and monitoring actions in this plan • The installation and maintenance of additional artificial watering points for the black-throated finch. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
	No injury or death to BTF individuals, nests or their young during vegetation clearing	Pre-clearance surveys will be conducted by a suitably qualified ecologist throughout BTF habitat prior to the commencement of each stage of clearing to identify and map significant areas for the BTF. Where active nests or other sensitive habitat areas are identified during the pre-clearing	Confirm and identify the spatial extent and condition of BTF habitat to be disturbed prior to any clearing or disturbance commencing, through pre-clearance surveys. BTF surveys will focus on confirming species presence throughout the Project Area, identifying species presence in	• Vegetation clearance undertaken without a pre-clearance survey. • Clearance of vegetation does not follow vegetation clearance protocols with no progressive clearing plan developed prior to each stage of clearing.	The appropriate corrective actions will be implemented and may include*: • Depending on the extent of any injuries, injured BTFs will either immediately be taken to the nearest qualified veterinary practitioner or wildlife carer, or humanely euthanized on site by an authorised and trained person • Rectifying impacts of vegetation loss • Review and re design to avoid reoccurrence and address actual cause

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Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
		surveys specific actions will be implemented to address these areas. Suitably qualified and experienced fauna spotter-catchers will be present during vegetation clearance works within areas of BTF habitat and remnant vegetation. No tampering with BTF breeding places is to occur without the relevant approvals / permits. Any removal of nests will be required to be undertaken in accordance with the requirements of approvals. BTF deaths and injuries will be recorded, and managed in accordance with relevant guidelines. Record the areas of occupancy for all BTF prior to clearing activities that occur within the Project Area, adjacent to Project Area and areas suitable for BTF habitat rehabilitation.	proximity, but outside (adjacent to) Project Area and identifying areas of potential rehabilitation for BTF habitat values inside the Project Area, but outside the disturbance footprint. After BTF habitat clearing, a search for remaining BTF will be conducted as soon as practicable.	• BTF death or injury during vegetation clearing • Vegetation clearance undertaken without a qualified fauna spotter-catcher present during BTF habitat clearing	• Communication with personnel involved and across all site team members (for example, via toolbox meetings) • Incidents will be reported to DES and ~~DoE~~ DAWE within 24 hours by the Environmental Manager as per Species Management Program conditions. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
	No entangled BTFs	No mine-related equipment or infrastructure with the potential to entangle fauna (e.g. bundled mesh fencing) will be left in sensitive areas such as near water bodies or potential BTF foraging areas.	Regular site inspections in accordance with the Environmental Management Plan and System.	Notification of BTF found entangled. BTF death or injury	The appropriate corrective actions will be implemented and may include*: • Depending on the extent of any injuries, injured BTFs will be either taken to the nearest qualified veterinary practitioner or wildlife carer, or humanely euthanized on site by an authorised and trained person • Reviewing procedures and fencing protocols • Actions to avoid entanglement re occurrence • Incidents will be reported to DES and ~~DoE~~ DAWE within 24 hours by the Environmental Manager as per Species Management Program conditions. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
	Areas for BTF to relocate to remain available and in suitable condition concurrent with proposed clearing activities	Ensure the pre-disturbance condition of BTF habitat in non-mined areas and adjacent to the development is maintained and the condition of Offset Areas is being improved as per the OAMP. Offset Area condition adjacent to the mining leases is being improved as per the OAMP.	Habitat quality in non-mined BTF habitat will be monitored, including recording areas suitable for occupancy by BTF prior to clearing activity areas. The spatial extent and condition of BTF habitat to be disturbed will be confirmed and identified prior to any clearing or disturbance commencing, through pre-clearance surveys. BTF surveys will focus on confirming species presence throughout the Project Area, identifying species presence in proximity, but outside (adjacent to) Project Area and identifying areas of potential rehabilitation for BTF habitat values inside the Project Area, but outside the disturbance footprint. Deliver the Moray Downs West Offset Area Management Plan, as approved. The monitoring methods included in the *Moray Downs West Offset Area Management Plan* for the offset area are as follows: • method for determining monitoring locations is to apply the Guide to Determining Terrestrial Habitat Quality to calculate habitat quality scores • For the species stocking rate component, the monitoring method for BTF as outlined in this plan • For sites being monitored under the BTFMP within the offset area, use survey results to inform the habitat quality scoring under the OAMP (rather than duplicating survey effort at these sites).	Prior to clearing commencing, the quality of BTF habitat to which BTF displaced by clearing could be expected to relocate, is not suitable for BTF to relocate to.	The appropriate corrective actions will be implemented and may include*: • Delay clearing until sufficient suitable habitat is available • Review and redesign the monitoring and/or management program, increasing monitoring events, changing monitoring/management methodology • Review and redesign the clearing program • Assessment of the quality of BTF habitat in areas adjacent to proposed clearing (in mine site and offset areas) by a suitably qualified ecologist/person within 15 business days • Review of activities with respect to potential direct and indirect impacts. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
Progressive habitat restoration of disturbed areas	All temporarily disturbed areas rehabilitated within 12 months of activity	The time between clearing BTF habitat, and the next construction activity will be as short as possible. However, the time between BTF habitat clearing and next activities will be a maximum of 12 months. All temporarily disturbed areas will be rehabilitated as soon as possible following completion of use, where such activity does not compromise the ongoing operation of the project (e.g. increase bushfire risk).	Regular site inspections in accordance with the Environmental Management Plan and System. Measure the effectiveness of mitigation measures involving rehabilitation. Compare to relevant control sites or benchmarks for RE. Identify areas where rehabilitation effectiveness needs to be improved to achieve environmental objectives. Targeted searches during monitoring events for rehabilitation areas.	Cleared BTF habitat area exposed for 11 months. Temporary disturbance areas that are no longer required not rehabilitated, leading to excessive dust or other environmental nuisance or disturbance triggers.	When cleared BTF habitat area exposed for 11 months, rehabilitation of the impacted area. The appropriate corrective actions for disturbance triggers, will be in accordance with the Environmental Management System, implemented and may include*: • Review of process for temporary disturbance and monitoring to improve response time • Rehabilitation activities to be undertaken in areas of temporary disturbance. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
	Rehabilitation of disturbed areas that are no longer required for operations	Progressive rehabilitation of disturbed areas will commence as soon as possible and generally within 6 months of the completion of operations activities in each area, in accordance with the Rehabilitation Management Plan. Rehabilitation will only commence later than 6 months if there will be benefits in coinciding commencement with the wet season. Rehabilitated areas must include food and water resources, and open foraging areas.	Monitoring surveys will be conducted biannually for a 10 year period by suitably qualified ecologists in accordance with standard methodology to identify changes in BTF population size and movements over time. A year of monitoring is defined as two seasonal surveys that align with the timing of August to November (late dry season) and March to May (late wet season).	Annual rehabilitation monitoring report determines rehabilitated areas do not achieve outcomes as specified in Environmental Authority conditions.	The appropriate corrective actions will be implemented and may include*: • Delivering recommendations by a suitably qualified ecologist/expert for the reason for rehabilitation not achieving outcomes • Review of weather conditions / seasons and timing of rehabilitation activities • Trials of new rehabilitation methods. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
	Disturbed habitat is restored or enhanced as soon as practicable (See also Performance Criterion "All temporarily disturbed areas rehabilitated within 12 months of activity)	Management of habitat within the Project and offset areas will occur concurrently. The management will increase the carrying capacity of the adjoining habitat and provide refuge to BTF no longer able to utilise cleared areas. Rehabilitated areas must include food and water resources, and open foraging areas. A combination of short-term fast acting habitat modification activities (such as shrub layer reductions and grass layer improvements) to improve habitat qualities for BTF foraging, and longer-term activities such as weed management replanting programs to rehabilitate heavily disturbed areas over time.	Banding and re-sighting techniques will provide a basis for assessing movement patterns and assessment of population dynamics. Targeted searches for BTFs in each rehabilitated area. Monitoring measures as shown on previous page (same row of table)	Disturbance areas that are no longer required not rehabilitated, leading to excessive dust or other environmental nuisance or disturbance triggers. (See also Triggers for Performance Criterion for "All temporarily disturbed areas rehabilitated within 12 months of activity)	The appropriate corrective actions in accordance with the Environmental Management System will be implemented and may include*: • Review of process for temporary disturbance and monitoring to improve response time • Rehabilitation activities to be undertaken in areas of temporary disturbance. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
Improve awareness of site personnel	All site personnel aware of management requirements with respect to BTF	Incorporate information regarding BTF (such as map of habitat areas within the Project Area) and BTF management requirements into site inductions, toolboxes and pre-starts, particularly where working in or around BTF habitat. Identification posters for all threatened species with the potential to occur in the Project Area will be displayed in prominent positions.	Records kept as a part of the Environmental Management System of inductions, training and toolbox meetings to ensure site personnel receive the appropriate environmental training.	Environmental harm to BTF or their habitat as a result of site personnel activities.	The appropriate corrective actions in accordance with the Environmental Management System will be implemented and may include*: • Depending on the extent of any injuries, injured BTFs will be either taken to the nearest qualified veterinary practitioner or wildlife carer, or humanely euthanized on site by an authorised and trained person • Rectifying impacts of vegetation loss • Review of induction information and implementation processes to ensure BTF management requirements are addressed and distributed to all site team members • Additional educational awareness training for site personnel • Incidents will be reported to DES and ~~DoE~~ DAWE within 24 hours by the Environmental Manager as per Species Management Program conditions. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

Commented [YM19]: Clarification on how a successful year of monitoring is defined. See also Section 7.1.1. This addresses DES comment 3b

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Table 99 Management objectives, performance criteria, adaptive management triggers and corrective actions – Potential indirect project impacts

#	Potential indirect project impact	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
3	Increased exotic pasture and weed invasion of key habitat areas	Reduce weed competition	No introduction of pest plants, invasive understorey species into BTF habitat. No significant increase in the abundance of weeds across the Project Area and into / from adjacent habitat.	Weed control will focus on managing declared pest plants and invasive species during construction and operations, in accordance with the project pest management plan. Weed hygiene controls, including the use of weed wash down stations, will be implemented in accordance with the project pest management plan to prevent the introduction and spread of declared pest plants and other invasive weeds. Weed free areas within sensitive BTF habitat will be identified and mapped with strict weed control requirements for entering weed free areas. The establishment of new tracks through BTF habitat outside of the clearing areas will be minimised to prevent transport of weed seeds into BTF management areas. Provide weed wash-down stations at all Project Area entry and exit points, and tracks through known weed-infested areas. Enforce the use of weed wash-down stations at all times. Adaptive management of weed controls to minimise threats to BTF and their habitat.	Monitoring of weeds will be conducted yearly (including photo monitoring) or as per the project pest management plan. Monitoring will be for pest plants in BTF habitat in, and adjacent to, the Project Area (consistent with the OAMP). Monitoring will occur at the optimal time for detecting and identifying pest plant species. Monitoring will include for the presence of declared weeds, and abundance of environmental weeds.	• Introduction or establishment of declared pest plants, and invasive species into previously unaffected areas. • Results of weed monitoring indicate a degradation of BTF habitat values, due to a proliferation of weeds. • A significant increase in the abundance of weeds, or pests or identification of new infestations. • Infestation of new weed species.	The appropriate corrective actions will be implemented and may include: • Eliminate potential sources or reasons that may have attributed to an increase in species richness and/or relative abundance of weeds • Amending weed hygiene restrictions • Providing additional educational awareness training for site personnel to ensure weed hygiene restrictions are adhered to • Revising weed control methods in accordance with the *Biosecurity Act 2014* • Take action to protect and restore BTF habitat values through implementation of site-specific measures such as weed control, fire management or grazing • Actively manage weeds to maintain and enhance BTF habitat values • Increasing the frequency and intensity of weed controls • Updating weed control methods in targeted weed control programs and plans. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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#	Potential indirect project impact	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
4	Grazing of key habitat areas that changes the ground cover composition	Strategic use of grazing to manipulate the grass layer and manage fire by reducing fuel loads and therefore fire intensity. Do not allow grazing itself to become a threat.	Grass load is managed to reduce fire risk in accordance with controlled grazing methods. Grazing does not become an impact to grass layers and grass composition	The management of grazing within non-mined areas will be based on existing sustainable pastoral management practices, pastoral holding lease conditions and associated legislation and apply to agistees. Management actions will seek to maintain and enhance BTF habitats and populations (e.g. pest control, water source, grazing and fire management) for factors in the~~Adani's~~ control of Bravus in unmined parts of the Mine Area, as well as in offset areas. Factors outside ~~Adani's~~the control of Bravus include drought, fires started by lightning, pests from neighbouring properties, flood, natural disasters and diseases. Grazing in the vicinity of the Ten Mile Bore area (3 km radius of the bore), will be managed to 1 beast ~~.~~ per 20 hectares, as per grazing plan outlined in **Figure 6**.~~.~~	Native perennial ground cover and ground composition assessed annually against the baseline data Monitor the condition of BTF habitat adjacent to the development and the Offsets Area. This will be undertaken using standard BioCondition monitoring surveys (see Eyre *et al*. 2011 for details) and species habitat index. The quality of known BTF water sources will be monitored. Annual BTF habitat vegetation (groundcover) assessments will occur ~~during~~ no later than the end of May within 2 ha plots at the following locations: CHAB02, CHAB03, CHAB22, CHAB23, CHAB24, CHAB25, CHAB37, CHAB45, CHAB47, CHAB48, CHAB52 (Open cut disturbance areas) and CHAB01, CHAB04, CHAB05, CHAB09, CHAB10, CHAB44 and CHAB46 (Underground disturbance areas). Vegetation assessments will use methodologies described within baseline 'Report for Black Throated Finch On-site Monitoring Survey' dated 127 ~~July~~ October 2013 to assess ground cover and ground composition based on Queensland BioCondition Framework (Eyre *et al*. 2011) and the Queensland Herbarium flora survey methods (Neldner *et al*. 2005). Maintain a register of cattle numbers per paddock, and calculate a daily average for each month of beasts (e.g. if zero beasts for half the month, and 100 beasts for half the month, then daily average for the month is 50 beasts). See Section 6.4.1.	• Annual vegetation assessment demonstrates a loss of native perennial species and / or cover from baseline conditions • A significant increase in the abundance of non-native species such as Buffel Grass • Incidence of uncontrolled bushfire • Stocking rate of more than 1 beast ~~.~~ per 20 ha in the Ten Mile Bore area, or contrary to grazing plan outlined in **Figure 6**.	The appropriate corrective actions will be implemented and may include*: • Additional fencing • Spelling of paddocks to control grazing (including wet season spelling) • Reduction, or removal, of cattle in the Ten Mile Bore area • Additional controlled grazing to reduce biomass levels • Additional pest controls • Further fire management. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

Commented [YM23]: Included wet season spelling as a corrective action

Commented [YM20]: Changed to reflect flexibility in climatic variables

Commented [YM21]: Updated to more recent version of same report

Commented [YM22]: Included a method on how this should be done

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#	Potential indirect project impact	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
					Moray Downs West Offset Area The monitoring methods included in the *Moray Downs West Offset Area Management Plan* for the offset area are as follows: • method for determining monitoring locations is to apply the Guide to Determining Terrestrial Habitat Quality to calculate habitat quality scores • For the species stocking rate component, the monitoring method for BTF as outlined in this plan • For sites being monitored under the BTFMP within the offset area, use survey results to inform the habitat quality scoring under the OAMP (rather than duplicating survey effort at these sites) Further monitoring methods for BTF in the offset area are consistent with this plan, such as: • water source watches • active searches • incidental observations • remote cameras • vegetation condition assessments • foraging plot assessments.		

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#	Potential indirect project impact	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
5	Wildfire or inappropriate fire management of key habitat areas that changes ground cover composition	Maintain a mosaic of fire history in BTF habitat. Reduce the risk of bushfire spread	No uncontrolled fires (bushfires) in the Project Area. Fire management is conducted in accordance with the Fire Management Plan	Planned burns within BTF habitat will be undertaken outside of the BTF breeding season as much as possible. This will depend on seasonal conditions from year to year, and the risk of uncontrolled bushfire. The fire regime will be managed to utilise a patchwork of areas of different fire frequencies and times but biased toward low intensity fires. This regime would also help to reduce the risk of widespread hot fires by reducing fuel loading at the landscape scale. Higher intensity fires can be used strategically to reduce dense stands of *Acacia* spp., which may affect BTF foraging habitat. Two fires, approximately 2-3 years apart, could reduce the abundance of these species but it would be important to then allow several years for recovery of the community. The existing network of roads and tracks will be used to manage fire, rather than establishing additional firebreaks. This will help reduce the risk of weed incursion through movement of traffic into intact grasslands. Avoid the planning of scheduled burns in BTF habitat during the wet season as much as possible. Any planned burns during the breeding season that cannot be avoided will be carefully managed with respect to location relative to water sources and preferred breeding areas so as to seek opportunity to exclude these areas.	Monitoring of fuel load levels and native perennial ground cover and ground composition will be assessed at least annually against the baseline data. Additional monitoring actions as per the Fire Management Plan.	• Unplanned burn during the breeding season. • Dense shrub layers forming in BTF habitat due to fire promoted germination. • Incidence of uncontrolled bushfire	The appropriate corrective actions will be implemented and may include*: • Review of fire regime based on monitoring results and aim to achieve appropriate balance of groundcover/shrub layer management without degrading foraging habitat • Increasing the frequency of biomass monitoring • Amending the strategic grazing regime • Reviewing effectiveness of firebreaks, and establishment of additional fire breaks • Modifying the timing and/or intensity of controlled burns. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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#	Potential indirect project impact	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
		Reduce the risk of bushfire ignition	No bushfires sparked by project activities.	Prior to site entry, all relevant site personnel, including contractors, will be made aware of fire safety and risks, including compliance with the Fire Management Plan. Bushfire mitigation measures will be specified in the Fire Management Plan and will include but not be limited to: • Monitoring of weather conditions to identify high fire risk days, with controls upgraded on these days • Restrictions on vehicles being left idling with the exhaust in contact with dry grass • Designation of smoking areas • Development of bushfire fuel management practices in the Project Area • Minimise the residency time of accumulated coal around coal handling facilities to reduce the risk of spontaneous combustion • Ensure all crews are equipped to deal with fires. This includes both fire-fighting equipment and training • Monitor pasture biomass at the beginning of the wet season • Work sites will be provided with adequate fire-fighting equipment (water cart) and training • implement actions to prevent and suppress the spread of fire, should bushfire be ignited.	Monitoring of fuel load levels and native perennial ground cover and ground composition will be assessed at least annually against the baseline data. Additional monitoring actions as per the Fire Management Plan.	• Bushfire sparked by project activities.	The appropriate corrective actions will be implemented and may include*: • Mitigate the established source, arising from the investigation, as to why and how the bushfire was sparked by project activities • Review existing Fire Management Plan, ensuring consideration of ecological values and Rural Fire Service recommendations • Greater monitoring of adherence to fire management measures • Amending the strategic grazing regime • Modifying the timing and/or intensity of controlled burns • Re-training of site team members • Delayed additional BTF habitat clearing • Assess the benefits of strategic burning prior to the storm season to address pasture biomass that is unfavourable to BTF. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
6	Feral animal impacts	Reduce habitat degradation from grazing by introduced herbivores Minimise predation risk by invasive mammals Adaptive management of weed and pest controls to minimise threats to BTF and their habitat.	No measured increase in rabbit, goat, fox and / or cat numbers in the Project Area.	Adaptive management of pest controls to minimise threats to BTF and their habitat. A project pest management plan will be developed and implemented prior to construction and operations, including measures for controlling rabbits, goats, foxes, cats and weeds. The project pest management plan will be developed in conjunction with neighbouring land owners, and will focus on tracks, waterways and habitat edges. Feral cat control outlined in the project pest management plan will focus on areas where BTF will be exposed and vulnerable to predation including on the interface of the clearing front and remnant vegetation and at water sources where BTF are vulnerable to attack while drinking.	Monitor the presence and population abundance of invasive fauna will be yearly as per the project pest management plan.	• Significant increase in the population of any invasive predator species from baseline scores. • Observed (or evidence of) predation of BTF by pest species • Observed habitat degradation attributed to threatening pest species	The appropriate corrective actions will be implemented and may include*: • Increasing the frequency and intensity of pest animal control. • Revising methods of pest animal control in accordance with Queensland Department of Agriculture and Fisheries (DAF) guidelines, and coordinate with neighbouring land owners to ensure a consistent approach • Reviewing actions and methods included in the project pest management plan • Updating pest animal control methods in targeted pest animal control programs • Increase feral herbivore management efforts, in conjunction with neighbouring land owners • Increase invasive predator management efforts, in conjunction with neighbouring land owners. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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#	Potential indirect project impact	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
				Feral cat control, as specified in the project pest management plan will focus on areas where BTF will be exposed and vulnerable to predation including on the interface of the clearing front and remnant vegetation and at water sources where BTF are vulnerable to attack while drinking.		>Significant increase in the population of any invasive predator species from baseline scores.	
				Domestic animals will not be permitted into the Project Area, except for cattle and, when required for mustering, horses and dogs.	Regular site inspections in accordance with the Environmental Management Plan and System.	Domestic animals not permitted are observed in the Project Area	The appropriate corrective actions in accordance with the Environmental Management System will be implemented and may include*: • Rectifying impacts • Communication with personnel involved and across all site team members (for example, via toolbox meetings) • Review the project pest management plan. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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Table 10~~10~~ Management objectives, performance criteria, adaptive management triggers and corrective actions – Matters required to be addressed under EPBC Approval, condition 6

#	Matters under EPBC Approval, condition 6	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
7	Loss or degradation of water sources	Ensure water quality in known BTF water sources outside disturbance footprint remain within acceptable limits. Reduce degradation of suitable water sources	Emissions (i.e. dust, coal and heavy metals) do not degrade water source quality in BTF habitat, when compared with baseline water quality established prior to operations. Water sources not disturbed by other processes, such as overuse by cattle	Project impacts like, dust and cattle access will be minimised by the implementation of the Environment Management Plan, using standard procedures typical of large infrastructure projects. Maintain the required condition of water sources. Erosion and sediment control measures will be implemented where required, to reduce the potential for contamination of water sources prior to commencement of construction activities.	Annual monitoring, including photo monitoring, of water source availability, in the driest season Water and sediment samples will be collected in areas with the potential to be impacted by mining activities to test for the presence of heavy metals and chemical contaminants (annually during the dry season). Water and sediment quality will be compared with baseline results established under the Receiving Environment Monitoring Program (natural waterways) and/or results from monitoring of water sources either prior to operations or in areas more than 5 km from active mining.	Physical evidence of dust degradation to water sources outside active mining areas. Water and sediment samples of water quality do not meet guideline triggers.	The appropriate corrective actions in accordance with the Environmental Management System will be implemented and may include*: • More frequent chemistry testing to confirm water quality against relevant standards and baseline values, in the event that visual inspection of dust impacts fails • Review and re design to avoid reoccurrence and address actual cause • Review adherence to control procedures to ensure compliance • Take remedial action where compliance has not been adhered to • Communication with personnel involved and across all site team members (for example, via toolbox meetings) • Reporting to DES as per statutory and project requirements where incidents trigger reporting thresholds. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
		Protection of environmental values within waterways of the receiving environment. Minimise siltation of water resources	No contamination of surface waters by effluent outside the active Mining Areas No degradation by siltation of permanent water sources.	Sewage waste for the operation workforce will be treated in a package treatment plant to a Class A standard. All effluent will be recycled onsite for reuse or controlled discharge. Vegetation clearing near, or within ephemeral waterways will be avoided when rain is falling, or imminent. Management of erosion and sedimentation will be undertaken in accordance with a Project Erosion and Sediment Management Plan. This plan will identify all practices to be implemented prior to, during, and post-construction to minimise the potential for erosion to occur, including (but not limited to) timing of clearing activities, sediment and erosion control measures to be implemented, performance criteria and corrective actions. Implement dust control measures. Erosion and sediment control measures will be implemented where required, to reduce the potential for contamination of water sources prior to commencement of construction activities.	Monitor the efficacy of erosion control measures (at least monthly), such that measures can be constantly improved throughout life of Mine. Water and sediment samples will be collected in areas with the potential to be impacted by mining activities to test for the presence of heavy metals and chemical contaminants (annually during the dry season).	Monitoring results record exceedance and contamination of surface water.	The appropriate corrective actions will be implemented and may include*: • Review and re design to avoid reoccurrence and address actual cause • Review adherence to control procedures to ensure compliance • Take remedial action where compliance has not been adhered to • Communication with personnel involved and across all site team members (for example, via toolbox meetings) • Reporting to DES as per statutory and project requirements where incidents trigger reporting thresholds. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

Commented [YM24]: Updated to clarify sampling regime and comparisons. See also new text in Section 7.1.2.1

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#	Matters under EPBC Approval, condition 6	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
		Maintain access to water	No net loss of suitable permanent water sources.	Permanent water sources in retained suitable BTF habitat in the Project Area will not be drained or lost as a result of drought unless suitable alternative water supplies (such as permanent water with gently sloping, bare ground at the edge) are available within suitable habitat within 3 km, or connected habitat outside of the ML. This includes permanent water sources in waterways and dams. Maintain water troughs for BTF within undisturbed areas and surface areas of underground mining footprint and repair where necessary troughs, pipes and tanks to a standard that maintains a constant source of water. Known water sources will be avoided, or alternative water sources established outside the disturbance footprint, if avoidance is not possible.	Weekly inspections of water infrastructure at Ten Mile Bore, to ensure suitable water supply available to BTF. Monitoring of water levels and availability across all water sources (fortnightly inspections at all sites other than Ten Mile Bore).	Draining of suitable permanent water source in retained BTF habitat, without an offset water source provided.	The appropriate corrective actions will be implemented and may include*: • Review and re design to avoid reoccurrence and address actual cause • Review adherence to control procedures to ensure compliance • Undertake chemical testing of any water source that fails a visual inspection or increased monitoring events • Take remedial action where compliance has not been adhered to; including repairs where necessary troughs, pipes and tanks to a standard that maintains a constant source of water • Implement remedial actions to provide supplementary water sources. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
		Reduce the risk of contamination of BTF habitat by chemicals, fuel, heavy metals etc.	No pollution of BTF habitat by contaminants (e.g. chemicals, fuel etc.).	Any sites used for chemical and fuel storage will be located a safe distance away from BTF habitat, with bunding or other raised barrier, resistant to normal flood events, between chemicals and habitat. All vehicles and machinery will be cleaned and maintained to minimise the introduction of contaminants such as oil and fuel.	Design and implement a monitoring program, in accordance with the ~~Water Receiving Environment Management~~ Monitoring Program~~lan~~. The monitoring program will target key areas with low flow, and water sources of known BTF locations. Water and sediment samples will be collected in areas with the potential to be impacted by mining activities to test for the presence of heavy metals and chemical contaminants (annually during the dry season). Erosion and sediment control measures will be implemented where required, to reduce the potential for contamination of water sources prior to commencement of construction activities.	Pollution of BTF habitat by contaminants.	The appropriate corrective actions will be implemented and may include*: • Minimising and rectifying impacts • Training and / or communication with personnel involved and across all site team members • Reporting to DES as per statutory and project requirements where incidents trigger reporting thresholds. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

Commented [YM25]: The REMP is the correct name for this program

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#	Matters under EPBC Approval, condition 6	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
8	Mine dewatering	Manage the impacts of mine dewatering	Permanent water sources in retained suitable BTF habitat in the Project Area not drained or lost as a result of changes in hydrology, unless suitable alternative water supplies (such as permanent water with gently sloping, bare ground at the edge) are available within suitable habitat within 3 km, or connected habitat outside of the MLA. This includes permanent water sources in waterways and dams.	Maintain water troughs for BTF within undisturbed areas and surface areas of underground mining footprint and repair where necessary troughs, pipes and tanks to a standard that maintains a constant source of water. Known water sources will be avoided, or alternative water sources established outside the disturbance footprint, if avoidance is not possible. Erosion and sediment control measures will be implemented where required, to reduce the potential for contamination of water sources prior to commencement of construction activities.	Design and implement a monitoring program, in accordance with the Water Management Plan. The monitoring program will target key areas with low flow, and water sources of known BTF locations. Water and sediment samples will be collected in areas with the potential to be impacted by mining activities to test for the presence of heavy metals and chemical contaminants (annually during the dry season).	Draining of suitable permanent water source in retained BTF habitat, without an offset water source provided.	The appropriate corrective actions will be implemented and may include*: • Review and re design to avoid reoccurrence and address actual cause • Review adherence to control procedures to ensure compliance • Undertake chemical testing of any water source that fails a visual inspection or implement increased frequency of monitoring events • Take remedial action where compliance has not been adhered to; including repairs where necessary to troughs, pipes and tanks to a standard that maintains a constant source of water • Implement remedial actions to provide supplementary water sources. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
9	Earthworks	Minimise the risk of light vehicle and machinery strike during earthworks and operations	Vehicles only drive on designated access tracks, and the access tracks are defined in relevant overarching management plans (e.g. Environmental Management Plan).	All relevant site personnel, including contractors, will be made aware of the locations of BTF populations and the potential for birds to be foraging adjacent road sides. Vehicles and plant will drive on pre-determined roads only, and adhere to all speed limits, which will be clearly communicated.	~~Monitoring surveys will be conducted biannually for a 10 year period by suitably qualified ecologists in accordance with standard methodology to identify changes in BTF population size and movements over time.~~ ~~Banding and re-sighting techniques will provide a basis for assessing movement patterns and assessment of population dynamics.~~ Regular site inspections in accordance with the Project Environmental Management Plan to ensure vehicles and plant are operating only on defined roads, and adhering to speed limits, which shall be clearly communicated. Fauna spotter-catcher observations and results during the BTF habitat clearing progress will be fed into the monitoring results and adaptive management of clearing progression plans.	• Vehicles observed driving outside designated areas • Light vehicle or machinery strike during other activities	The appropriate corrective actions will be implemented and may include*: • Rectifying impacts • Review and re design to avoid reoccurrence and address actual cause • Communication with personnel involved and across all site team members (for example, via toolbox meetings). *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

Commented [YM26]: First two paragraphs did not relate to the management objective. New text aligned with the management objective has been added.

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#	Matters under EPBC Approval, condition 6	Management objective	Performance Criteria	Management Actions	Monitoring	Trigger for adaptive management and corrective actions	Corrective actions
10	Noise and vibration	Minimise habitat modification	No abandonment of BTF nests due to noise, and vibration disturbance	Project impacts like noise, dust and lighting will be minimised by the implementation of the Environment Management Plan, using standard procedures typical of large infrastructure projects.	During the breeding season the Environment Manager will monitor verified BTF nests within 1 km of active operational areas (weekly at a minimum) Any signs of possible abandonment will be verified by a suitably qualified ecologist, who will consider the role of noise and vibration in the abandonment.	Abandonment of a BTF nest without signs of predation, which is likely to have been caused by noise and vibration.	The appropriate corrective actions will be implemented and may include*: • Assessment to establish (a) abandonment of a BTF nest was without signs of predation; and (b) determine the root and contributing causes as being likely caused by noise and vibration • Review and re design to avoid reoccurrence and address actual cause • Communication with personnel involved where appropriate and across all site team members (for example, via toolbox meetings). *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
11	Emissions, including dust	Minimise emissions (dusts)	The photosynthetic ability of grasses in BTF habitat are not inhibited by dust emissions from the Project Area.	Regular watering of project areas in accordance with procedures under the Environmental Management Plan. Vehicles will be cleaned regularly and are not to be overloaded. Coal dust will be managed in accordance with the Environmental Management Plan	Regular site inspections in accordance with the Project Environmental Management Plan and Management System. Emissions and dust monitoring undertaken under the construction and Environmental Management Plan.	Growth of grasses in known BTF habitat in, and adjacent to, the Project Area are inhibited due to dust emissions.	The appropriate corrective actions will be implemented and may include*: • Where monitoring shows a reduction in habitat condition due to dust, mitigate source of dust • Review and re design to avoid reoccurrence and reduce dust emissions impacts on habitat. • Communication with personnel involved and across all site team members (for example, via toolbox meetings). *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
12	Light spill and other visual impacts	Minimise light spill	Light disturbance in known BTF habitat adjacent to works limited to <100 m.	Install light controlling devices to deflect lighting away from adjacent habitats. Avoid using unnecessary lighting.	Regular site inspections in accordance with the Environmental Management System.	Direct light spill >100 m into known BTF breeding habitat.	The appropriate corrective actions will be implemented and may include*: • Review and re design of light controlling devices, or adjust location of light, to reduce light spill and lighting levels below trigger levels • Communication with personnel involved and across all site team members (for example, via toolbox meetings). *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.
13	Stream diversion and flood levees	Reduce the impact of stream diversion and flood levees	All suitable permanent water sources are maintained.	As per the management actions included in items 9 to 12.	Annual monitoring, including photo monitoring, of water source availability, in the driest season	Draining of suitable permanent water source in retained BTF habitat, without an offset water source provided.	The appropriate corrective actions in accordance with the Environmental Management System will be implemented and may include*: • Review and re design to avoid reoccurrence and address actual cause • Review adherence to control procedures to ensure compliance • Take remedial action where compliance has not been adhered to; including repairs where necessary troughs, pipes and tanks to a standard that maintains a constant source of water • Implement remedial actions to provide supplementary water sources. *Tailored corrective actions will be implemented to best deliver the performance criteria and management objective, and aim to avoid triggering in the future. The list of corrective actions provided are a starting point, but could include additional actions.

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6.4 Habitat management measures

In accordance with EPBC conditions 6d) to f) and EA condition I6e), measures will be implemented to manage BTF habitat to prevent further decline and, in the case of the offsets area, improve the condition. These management actions are also required to address potential Project impacts identified in EPBC condition 6c).

Managing BTF habitat requires management of three broad elements: the woody layer of the vegetation, the herbaceous layer of the vegetation and water sources. Grazing and fire are important drivers of the composition and structure of both woody and ground layers of the vegetation and managing grazing and fire is important for the maintenance and management of habitat quality for the BTF (Bousi 2011). While useful tools, these factors cannot be used to shift from one vegetation community to another as the vegetation community that occupies a particular location is largely driven by soil type and rainfall regime. Management measures are described below in relation to the threats outlined in **Section 4**.

6.4.1 Grazing management

Grazing will be used in the Project Area as a controlled management tool to manage threats to BTF habitat. Grazing will be used to decrease the abundance and presence of weeds, including Buffel Grass and other exotic pasture grasses, and control fuel loads so as to reduce the risk of an uncontrolled fire.

A low impact grazing regime takes into consideration a number of management practices such as stocking rates, pasture resting or spelling, fire management, fencing, weed management and watering point management (Hunt et al, 2014; DAF 2017). Managing the stocking rate across the Moray Downs Property is one measure of managing the potential impact of grazing on BTF Habitat. Stocking rates are dynamic and typically adjusted seasonally and in response to other factors such as climatic conditions.

The management of grazing within non-mined areas will be based on pastoral management practices under land agistment agreements, pastoral holding lease conditions and associated legislation. Sustainable grazing guides such as the 'Sustainable management of the Burdekin grazing lands' (McIvor 2012) will also guide the management of grazing activities. The following actions will be delivered under the legislation, agreements and conditions:

- Maintain a stocking rate of 1 beast / 20 hectares in BTF habitat north of the Carmichael Road on the Mining Lease and 1 beast / 10 hectares in BTF habitat to the south of the Carmichael River on the Mining Lease (Error! Reference source not found.~~Figure 6~~). **Table 8** describes the corrective actions associated with potential grazing impacts including the changing of stocking rates and other practices such as spelling.
- ~~Adani~~ Bravus will complete annual BTF habitat vegetation (groundcover) assessments at the following approved monitoring locations ~~during~~ no later than the end of May: CHAB02, CHAB03, CHAB22, CHAB23, CHAB24, CHAB25, CHAB37, CHAB45, CHAB47, CHAB48, CHAB52 (Open cut disturbance areas) and CHAB01, CHAB04, CHAB05, CHAB09, CHAB10, CHAB44 and CHAB46 (Underground disturbance areas). ~~–~~Maps and coordinates of these locations are provided in **Appendix B**.
- The baseline (2013 and 2014) groundcover and native perennial species composition at 23 established baseline monitoring sites are included in Appendix F. Baseline characteristics are:
  - 34% cover native perennial grass cover (minimum). Baseline standard deviation is 12.1%
  - 27% bare ground
  - four native grass species per site (minimum)
  - 2.4% native perennial forb cover

Commented [YM27]: Reference to new figure showing paddock layout and grazing plan

Commented [YM28]: Changed to allow flexibility for climatic variables

Commented [YM29]: Sites have been listed here as suggested by DES. Coordinates and updated maps are provided in Appendix B

Commented [YM30]: Time period of data clarified to avoid confusion with Appendix E, which was a longer period. See Appendix F for rationale.

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- o 1.8% native annual grass and forbs
- Vegetation assessments will use methodologies described within the 'Carmichael Coal Mine and Rail SEIS Report for Black-throated finch On-site Monitoring Survey 2' dated February 2014 to assess native perennial groundcover and ground composition based on Queensland BioCondition Framework (Eyre *et al*. 2011) and the Queensland Herbarium flora survey methods (Neldner *et al*. 2005)
- Groundcover and species composition will be assessed annually against the baseline data (established in 2012/13) from when this Management Plan commences (~~each~~ no later than the end of May)
- If the annual vegetation assessment demonstrates a loss of native perennial species and cover from baseline conditions, an investigative review will be completed and relevant corrective management actions will be taken to ensure the maintenance or enhance of these perennial pasture species
- Corrective actions may include additional fencing or spelling of paddocks to control grazing, controlled grazing to maintain biomass levels, pest control (e.g. rabbits, weed eradication) and fire management.

Data collected through the groundcover assessments, in addition to other data on grazing and BTF habitat values, will be used to guide the subsequent grazing and fire management regime (**Section 6.4.2**) for the upcoming year. Indicators including vegetation biomass, native perennial grass cover, bare ground, diversity of native grass and forbs, and presence and abundance of weeds will assist in determining future management objectives. Results will be presented in the annual report, with discussion on how they informed the future management of grazing and fire in the subsequent year.

Stocking rates will be calculated for each paddock, based on a daily average of beasts (head of cattle, regardless of size, age or sex) across the month. That is, the number of beasts will be counted for each day of the month, with an average for the month calculated.

Since BTF have been shown to access a range of artificial water sources, including drinking at troughs visited by cattle, it would not be necessary to restrict cattle from existing troughs or watering points. However, in accordance with EA Condition I8, water troughs for BTF must be maintained within undisturbed areas and surface areas of the underground mining footprint. Also, the condition includes a requirement to repair, where necessary, troughs, pipes and tanks to a standard that maintains a constant source of water. The retention or provision of some trees / shrubs within a suitable distance to water may increase utilisation of water sources, by providing shelter for birds if they are disturbed by the arrival of large groups of cattle, allowing them to return to drink when the cattle depart.

Commented [YM31]: Changed to allow flexibility in climatic variables

Commented [YM32]: Added to address DES comment 2b

Commented [YM33]: Clarification of definition of beast. We considered changing this to adult equivalents, but all baseline data to date is in beast format, and we are keen to maintain consistency. This is an update since the previous version reviewed by DES.

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Figure 6 Map showing the management of grazing across the project area

Commented [YM34]: New map showing grazing management. Provided in A3 as too small to read in A4.

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6.4.2 Fire management

Fire and grazing can be considered competitors of one another for the available grass fuel / forage. In considering the use of cattle grazing to manipulate the grass fuel load and distribution it is also important to address other aspects of the herbaceous layer that will be affected by grazing, namely species composition and seed production. Breeding of BTF must be monitored in terms of location and timing so that breeding locations are not burnt when birds are nesting (constructing breeding nests, incubating and feeding nestlings).

Given the uncertainty around and complexity of the relationship between fire and habitat quality, it is important that all parts of a landscape being managed for BTF are not subject to the same fire regime. In general, the overall fire regime of the Project Area will aim to be one of periodic, small scale, low intensity fires being used to target areas that are developing a shrubby understorey. However, the outcomes of the BTF Research Program will also study the relationship between fire and habitat quality. The outcomes of that research will inform fire management in the Project Area and this plan, once finalised.

Low intensity fires will temporarily open up the grass layer but generally are not known to kill tussocks. These types of fires will create foraging patches by improving accessibility to the grass seed that is present. Burning should not be carried out too soon after seed set, though BTF may forage on recently burnt land (Rechetelo 2016).

Fire will reduce the density of the shrub layer by killing obligate seeders and removing stems from re-sprouting species. Fire may also promote the germination of obligate seeders and other species, particularly *Acacia* spp. Currently there are areas of the Project Area that have dense stands of short-lived *Acacia* spp. as a result of fire-stimulated germination. BTF tend to avoid extensive areas of woodlands with a dense shrubby understorey, though they do use patches of shrubs or smaller trees for resting and shelter (Bousi 2011). Dense shrubby understoreys also tend to have fewer grasses and so are less productive in terms of the seeds upon which BTF forage.

Dense stands of these species can be reduced by fire frequencies shorter than the time between germination and seed production. Some of these species probably produce seeds within 3 to 4 years of germination (e.g. *Acacia holosericea*).

The existing network of roads and tracks will be used to manage fire, rather than establishing additional firebreaks. This will help reduce the risk of weed incursion through movement of traffic into intact understorey. The numerous existing tracks that were created during mine exploration and development, especially in the northern sector of the Project Area, provide firebreaks that can help ensure that prescribed fires are not extensive. The value of maintaining these tracks as firebreaks needs to be weighed up against the value of minimising the risk they present in terms of weed incursion and as useful foraging habitat. It is worth noting that BTF often forage on or in close proximity to tracks and other surfaces with low cover. The usefulness of these bare areas for foraging is dependent upon there being seed production in their immediate vicinity, so extensive bare areas are not valuable to BTF (Rechetelo 2016).

6.4.3 Pests

Weed management is addressed in a project specific Pest Management Plan (Adani 2015), which covers weeds and feral animals (pests). The Pest Management Plan has an overarching strategy, as follows:

- Identification of current and potential pest animals and plants for the area, and current locations of populations of pest animals and plants

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- Avoidance of travel through or establishing infrastructure in areas of known pest plant infestation
- Prevention of the introduction of new weed and pest animal species to the area
- Minimisation of the increase in distribution and abundance of currently present pest plants or animals
- Control of identified weeds and pest animals to contain, reduce or eradicate pest populations.

Actions associated with weed management align with this strategy. Weed management issues specific to BTF are the control of introduced grasses and other herbs that have a tendency to dominate the herbaceous vegetation and affect the seeding of grass species on which BTF rely. Incursions of weeds into new areas will be prevented. Existing weeds, including non-native grasses, will be managed, with the intent of reducing further incursion (Adani 2015).

Non-native plant species that are considered potentially detrimental to BTF habitat include Buffel Grass, Indian Couch, *Stylosanthes scabra* (in high densities), *Parthenium hysterophorus* (Parthenium) and other high biomass non-native grasses. Native understorey shrubs such as *Carissa ovata* and *C. lanceolata* can also be detrimental as they may increase in association with heavy grazing and little burning. Some of the short-lived *Acacia* spp. would be detrimental to BTF if they form extensive thickets.

Non-native invasive shrubs such as *Vachellia nilotica* (Prickly Acacia), *Ziziphus mauritiana* (Chinee Apple), *Jatropha gossypiifolia* (Bellyache Bush), *Stylosanthes humilis* and *Lantana camara* (Lantana), while not currently prevalent in the Project Area, will be prevented from establishing.

The risk of further incursions by high biomass grasses will be minimised by effective hygiene measures that include minimising traffic into BTF habitat, use of wash down facilities for vehicles, control of new infestations, avoiding movement of soil potentially bearing weed seeds or other propagules and minimising soil disturbance. The species of greatest concern is Buffel Grass. However *Themeda quadrivalvis, Hypharrhenia* spp. and Indian Couch are also a concern, though they are not currently common in the Project Area. Indian Couch is present but the health of the native perennials is probably sufficient to prevent it taking over.

The landscaping plan and rehabilitation plans for the Project will use as many native species as possible. No invasive species will be used in landscaping.

Habitat management measures for feral cats and feral pigs are provided in **Sections 6.4.5** and **6.4.6** respectively.

6.4.4 Water supply

Water bodies known or considered likely to be used by BTF, in as yet unmined and underground mining areas, must be identified to alert to their environmental significance. Controls to prevent contaminated run-off or fuel / chemical spills will be implemented to protect water quality for these sources. Controls to manage the protection of BTF water sources include the following:

- Storage of fuels and chemicals must be bunded to 110% the capacity of the storage facility. Storage areas must be at least 300 m from known watering points, waterbodies and waterways.
- Effective erosion and sediment controls must be installed around all topsoil and spoil piles, unless a native cover has been established which prevents run-off of materials.

Current water sources outside of the clearing footprint are to be maintained. Where it is necessary to remove a particular water source within or nearby to BTF habitat, a new water source will be created.

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These can be relatively small, have intact woodland in their immediate vicinity and have a few trees and / or shrubs close to their margins for BTF to perch on. It is also important to have canopied trees (especially Eucalypts) in which the birds can rest while travelling to and from the water source. Construction of BTF water sources to provide alternative watering points will be undertaken in conjunction with construction of water storage dams early in the mine implementation program.

In order to ensure that the watering points in the Moray Downs West offset area do not interfere with research but also provide water for finches, the following actions will be delivered:

- maintenance of the existing seven water points in the Moray Downs West offset area, as per the Moray Downs West Offset Area Management Plan
- new artificial water sources will be installed in locations within the Moray Downs West offset area in accordance with the BTF Research Program
- assessment of BTF responses to new water sources and their effectiveness
- results used to inform specific requirements and location of permanent artificial watering points
- permanent artificial watering points will be installed and adequately maintained within the Moray Downs West offset management area within the sooner of one year after the completion of the three-year BTF Research Program, or five years after the commencement of mining operations.

6.4.5 Feral cats

Feral cats are considered one of the threats to local populations of BTF. Ongoing feral cat control will be carried out as it would benefit many other native species in addition to BTF, including the threatened Squatter Pigeon. Feral cat control will be carried out in accordance with the Pest Management Plan for the Project. The key areas to be targeted for feral cat control to protect the BTF are those where birds are likely to be exposed and vulnerable to predation including on the interface of the clearing front and remnant vegetation and at water sources where BTF are vulnerable to attack whilst drinking.

6.4.6 Feral pigs

Feral pigs have the potential to damage BTF habitat and are therefore a threat to the species. Damage to BTF habitat is caused by disturbance of the soil while feeding, trampling of habitat, tusking or rubbing trees and the consumption of plants and soil organisms. Feral pig control will be carried out in accordance with the Pest Management Plan for the Project. Targeted site monitoring for pigs will focus on water courses and BTF feeding areas, where greatest impacts to BTF habitat are likely to occur. Humane pest control measures will be implemented to reduce pig numbers.

6.4.7 Management of Ten Mile Bore

Condition I9b of the EA states that the BTF Research Program must establish management actions to maintain the current BTF population of Ten Mile Bore and surrounds. Management of BTF habitat in the vicinity of Ten Mile Bore will therefore be informed by the findings of the BTF Research Program (**Appendix C**).

In order to comply with the requirement to maintain a viable population of BTF at Ten Mile Bore, ~~Adani~~ Bravus will develop a specific population estimate for this location. This estimate will be informed through existing data and the survey and monitoring program as well as outputs from the concurrent BTF Research Program delivered over the first 5 years from commencement. An initial population estimate will be developed after the first two years, reviewed annually, and then revised at the conclusion of the research program (5 years).

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The purpose of the population estimate is to assist with management actions at Ten Mile Bore to maintain the BTF population of the area. This includes the control of pre-existing grazing activities to ensure they do not have an adverse impact of habitat in the vicinity of Ten Mile Bore.

~~Adani~~ Bravus will establish a low impact grazing regime in the vicinity of Ten Mile Bore for the purpose of ensuring the BTF habitat in this vicinity can continue to support a viable population of BTF.

A low impact grazing regime takes into consideration a number of management practices such as stocking rates, pasture resting or spelling, fire management, fencing, weed management and watering point management (Hunt et al., 2014; Department of Agriculture and Fisheries, 2017).

Managing the stocking rate across the Moray Downs Property is one measure of managing the potential impact of grazing on BTF Habitat. Stocking rates are dynamic and typically adjusted seasonally and in response to other factors such as climatic conditions.

In establishing a low impact grazing regime for the vicinity of Ten Mile Bore (that is, within a 3 km radius), ~~Adani~~ Bravus ~~proposes~~ will implement a light stocking rate of 1 beast per 20 hectares (Error! Reference source not found.~~Figure 6~~Error! Reference source not found.). The following activities are designed to together maintain and enhance the quality of habitat in the vicinity of Ten Mile Bore:

Commented [YM35]: Reference added to paddock map

- Monitoring of grazing regimes described in Section 7.2.1
- Investigation and research into how optimal grazing regimes including pasture resting and spelling described in Section 4.6.1 of the BTF Research Program
- Section 4.6.2 of the BTF Research Program also provides details of how fire regimes will be investigated with respect to how they can contribute to the management of habitat values
- Fencing as a management action to maintain habitat quality and/or respond to new or emerging threats
- Land condition will be measured through annual vegetation assessments and through the ongoing monitoring program, augmented by research activities and outcomes
- Annual reviews (detailed in Section 9.2) will include a review of stocking rates in conjunction with other activities, not in isolation
- The findings of the BTF Research Program (3 to 5 years from approval of the plan) will inform ongoing management practices to ensure the maintenance of a viable population of BTF at Ten Mile Bore.

Other management measures include:

- Avoiding mining-related disturbance of the area until as late as possible (see **Section 6.3.1**)
- Maintaining water for BTF, to be monitored through weekly water infrastructure inspections
- Low impact grazing regime in the vicinity of Ten Mile Bore for the purpose of enhancing and maintaining BTF habitat values; being 1 beast per 20 hectares
- Ensuring adequate fencing and infrastructure is maintained to achieve performance objectives relating to water availability and grazing management.

6.4.8 Summary of mitigation and management measures

The mitigation and management measures to be implemented for the Project to minimise impacts to BTF for activities other than clearing are summarised in **Table 9**~~Table 9~~ and **Table 10**. These are relevant across all project stages and will be implemented prior to commencement of Project Stage 2 activities as defined by the Carmichael Coal Mine Environmental Authority. Regular monitoring across the site will identify any deterioration in BTF habitat values and trigger a site-specific corrective action. Such a

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response may involve the control of weeds, implementation of fire management actions or changes to grazing practices, to improve and restore BTF habitat values.

Mitigation of impacts on BTF and its habitat will in part be achieved through implementation of other plans including the CEMP and OEMP. These plans are regularly updated based on site conditions, the results of on-site monitoring and progression of project tasks. A summary of key elements of environmental management, as outlined in the project EIS, is provided in **Appendix A**.

6.5 Offsets

Conditions of approval for the Carmichael Coal Mine and Rail Project under the EPBC Act and within the Coordinator-General report require ~~Adani~~ Bravus to address offset requirements for significant residual impacts on MNES and Matters of State Environmental Significance. The approach to be taken by ~~Adani~~ Bravus to achieve the required offsets is outlined in the approved BOS (C02 2016) under Condition 8 of EPBC Act approval 2010/5736. Offsets will be delivered in stages, with Stage 1 offsets to be delivered through implementation of an offset area management plan.

A key mechanism for achieving offsets for BTF is management of the Moray Downs West offset area, which includes extensive areas of BTF habitat. The Moray Downs West offset area will be managed under the approved *Offset Area Management Plan: Moray Downs West,* (CO2 2017) including regular assessment to identify any future management and monitoring requirements until offset management objectives are achieved. The area provides an offset for the expected loss of BTF habitat from Stage 1 of the Project including potential impacts from subsidence caused by underground mining.

In the event that additional impacts are proposed, or occur unexpectedly, additional offsets will be provided, subject to approval from Commonwealth and State governments. This would include circumstances where the corrective management measures have not achieved the goals within specified timeframes, and resulted in impacts beyond those that were originally approved. Likewise, if ~~Adani~~ Bravus is able to minimise its disturbance of BTF habitat to a smaller area than approved, a corresponding reduction in offsets will be sought from the Commonwealth and State Governments.

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7 Monitoring and Research Programs

The management of the BTF population will be supported by targeted monitoring and research that will be undertaken for the Project. The results of monitoring and research will feed back into the management measures to guide adaptive management. The ongoing monitoring will be focussed on describing spatial and temporal patterns of occurrence while the research will focus on explaining spatial and temporal patterns and ecological relationships.

A BTF Research Program has been developed concurrently and provides a program for addressing specific scientific questions about BTF and its habitat (**Appendix C**). The Research Program details the objectives and methodologies to explain and predict patterns and processes relating to the distribution and abundance of BTF in the Project Area. This research will inform future management and monitoring of the BTF population within the Project Area.

7.1 Monitoring program

As required by Condition 6(b) of the EPBC Act approval, a monitoring program will be implemented upon approval of the management plan to inform assessments of the effectiveness of mitigation measures.

~~Adani's m~~Monitoring and research activities of Bravus will be used to characterise a population estimate for the local BTF observed at the project area. This will be developed at year 2 and year 5.

Development of the population estimate over this time frame will allow:

- Existing survey and monitoring data to be used to form a population estimate for Ten Mile Bore specifically, and the project area more broadly;
- Repeated survey and monitoring data to be collected and inform the population range;
- Implementation of research program studies with respect to population dynamics and other research priorities;
- The implementation of the DES Bioregional BTF Management Plan to better inform and understand regional BTF presence, population and threats;
- Concurrent on-ground actions to manage potential impacts and threats to the BTF; and
- Further understanding of species wide threats and impacts to the BTF population;

BTF population monitoring will occur for the life of the project (as per the commitment in Section 7.1) and this will include methods for estimating and informing ongoing population estimates.

Further refinement of the BTF habitat values will be undertaken over the life of the project. The purpose of which is to inform the habitat classification model developed during the EIS process. Refining the importance of habitat structure, food availability and proximity to permanent water will allow for greater understanding of how the BTF are using a range of habitat sources.

The level of disturbance of Project activities on BTF habitat will also be measured and the success of rehabilitation activities evaluated. As committed during the EIS process, ~~Adani~~ Bravus will collaborate with research institutions for aspects of the monitoring program, where such an approach would add value (e.g. identification of remnant vegetation changes resulting from subsidence).

The proposed monitoring regime will be used to provide feedback on the effectiveness of mitigation measures and to evaluate the success of rehabilitation activities. Monitoring of the BTF has already commenced as part of the baseline research program for the Project and ongoing monitoring programs locally. Initial monitoring will continue for a period of 10 years as required in the conditions of the

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Environmental Authority. A major review of the monitoring results will be completed at this time (after 10 years). This will result in the development of a long-term monitoring method that will be implemented for the life of the project. This will ensure compliance with EPBC Act approval conditions, which require monitoring for the life of the Project.

As with mitigation measures, some monitoring activities will be generic and broadly applicable across multiple ecological values, including BTF. Other monitoring activities will be species-specific and tailored to measure the effectiveness of mitigation measures at reducing the impacts of the Project on BTF. The design of specific monitoring tasks will be tailored to the variables being measured, and have sufficient replication to provide statistical power to detect significant change. Indicative monitoring sites have been chosen and the location of these will be confirmed through on site investigations during pre-clearance surveys. The team implementing monitoring will have the flexibility to relocate monitoring points to the closest representative habitat area if the site is unsuitable, based on observations in the field.

Commented [YM36]: New sentence to provide clarity that the team implementing monitoring can move the location of the sites a little as needed so that they are located in appropriate habitat. Some sites were initially chosen from maps and need to be refined, based on local conditions.

Monitoring measures to be implemented across the Project Area are detailed in **Tables 8 to 10**. **Table 11** provides an overview of monitoring measures.

Table 1114 Summary of monitoring measures to be implemented across the Project Area

Monitoring	Description
Pre-clearance surveys	Confirm and identify the spatial extent and condition of BTF habitat to be disturbed prior to any clearing or disturbance commencing, through pre-clearance surveys. BTF surveys will focus on confirming species presence throughout the Project Area, identifying species presence in proximity, but outside (adjacent to) Project Area and identifying areas of potential rehabilitation for BTF habitat values inside the Project Area, but outside the disturbance footprint.
Clearing	Monitoring surveys to be conducted biannually for a 10 year period by suitably qualified ecologists in accordance with standard methodology to identify changes in BTF population size and movements over time. Banding and re-sighting techniques will provide a basis for assessing movement patterns and assessment of population dynamics.
Condition	Monitor the condition of BTF habitat adjacent to the development and the Offsets Area. This will be undertaken using standard BioCondition monitoring surveys (see Eyre *et al*. 2011 for details) and species habitat index. The quality of known BTF water sources will be monitored. Additionally, annual BTF habitat vegetation assessments will occur ~~during~~ no later than the end of May each year within 2 ha plots at the following locations: CHAB02, CHAB03, CHAB22, CHAB23, CHAB24, CHAB25, CHAB37, CHAB45, CHAB47, CHAB48, CHAB52 (Open cut disturbance areas) and CHAB01, CHAB04, CHAB05, CHAB09, CHAB10, CHAB44 and CHAB46 (Underground disturbance areas). Vegetation assessments will use methodologies described within baseline 'Report for Black Throated Finch On-site Monitoring Survey' dated 172 ~~July~~ October 2013 to assess ground cover and ground composition based on Queensland BioCondition Framework (Eyre *et al*. 2011) and the Queensland Herbarium flora survey methods (Neldner *et al*. 2005). **Moray Downs West Offset Area** The monitoring methods included in the *Moray Downs West Offset Area Management Plan* for the offset area are as follows: • method for determining monitoring locations is to apply the Guide to Determining Terrestrial Habitat Quality to calculate habitat quality scores • For the species stocking rate component, the monitoring method for BTF as outlined in this plan • For sites being monitored under the BTFMP within the offset area, use survey results to inform the habitat quality scoring under the OAMP (rather than duplicating survey effort at these sites) Further monitoring methods for BTF in the offset area are consistent with this plan, such as: • water source watches • active searches

Commented [YM37]: Changed to allow flexibility in climatic variables

Commented [YM38]: Changed to more recent version of report

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Monitoring	Description
	• incidental observations • remote cameras • vegetation condition assessments • foraging plot assessments.
Weeds	Monitor the presence of declared weeds, and abundance of environmental weeds.
Pests	Monitor the presence and population abundance of invasive fauna.
Vegetation rehabilitation areas	Monitor the effectiveness of rehabilitation activities through BioCondition ~~or similar~~ assessment methods.
Water quality	Measure the effectiveness of rehabilitation activities, by monitoring water quality in accordance with the EMP.
Offset areas	Measure the effectiveness of offset management, by monitoring the quality of offset areas in accordance with the OAMP.
Fauna mortality and injuries	Record BTF fatality, including suspected nests / eggs of BTF.
Dust	Monitor dust within and adjacent to construction activities in accordance with the EMP.
Fire	Monitor incidence and extent of Project related fire, and determine impacts through BioCondition assessments.

Commented [YM39]: Removed ambiguity of "or similar" assessment methods. BioCondition covers it.

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7.1.1 Survey timing and frequency

Seasonal surveys will be undertaken biannually for a period of at least 10 years (commencing 2012) in order to satisfy relevant approval requirements and provide useful feedback into the management plan. Surveys will be undertaken to coincide with the end of the dry season (~~approximately late October~~August to November, with timing ideally late October) and the latter part of the breeding season (wet season; March to ~~April~~May). A successful year of monitoring implementation is defined as one survey completed within each of these seasonal periods. While monitoring outside of these periods is useful, it will not count towards the 10 years of seasonal surveys. Based on surveys completed to date (at the end of 2020), a further seven years of monitoring is required. A major review of the monitoring results will be completed after 10 years. This will result in the development of a long-term monitoring method that will be implemented for the life of the project.

Surveys will occur across all areas of known BTF habitat in the Project Area and adjacent to the Project Area, as well as all areas established for rehabilitation and offsets for BTF. The purpose of the surveys will be to document changes in distribution and abundance of BTF in the Project Area, relate that to habitat condition, quantify use of offset areas and provide feedback for adaptive management.

7.1.2 Survey methodology

The survey methodology for ongoing monitoring is based on the results and recommendations arising from baseline monitoring surveys undertaken to date and the specifications of Commonwealth and State approval conditions (e.g. Condition I6 of the EA), and relevant survey guidelines for BTF. The monitoring methodology is to transition from a methodology aimed at gathering presence / absence data alone, to one gathering data that will better explain BTF movements across the landscape as well as identify any trends in populations and monitor the effectiveness of management actions.

The methodology for BTF monitoring will include the following:

- Water source watches
- ~~Call play-back (this method has now been discontinued; see below)~~
- Identification of all birds present when BTF are encountered
- Active searches
- Opportunistic incidental observations gathered whilst traversing the Project Area
- Surveillance cameras
- Monitoring of subsidence areas
- Monitoring of pasture biomass
- Vegetation transects and plots.
- Annual monitoring of 2 ha groundcover plots
- Bioacoustic monitoring

Call playback was a useful monitoring technique implemented in the initial years of the monitoring program, to assist in detecting BTF in areas where their presence was uncertain. However, as BTF habitat use across the study area became better defined, call playback was found to have limited benefit. Limitations to call playback include potential disruption of natural behaviour and breeding activities, and difficulties in standardising the call that is played (e.g. location that the call was recorded and the type of call that is played).

~~Indicative m~~Monitoring sites and associated coordinates are shown in **Appendix B**. These sites will be reviewed following approval of the management plan, with additional vegetation sites included in the offset areas and subsidence areas. These additional sites will provide representation of critical BTF habitat,

Commented [YM40]: Breeding season changed to March-May, to allow greater flexibility of survey timing, based on climatic conditions.

Commented [YM41]: New text added in this paragraph to clarify when 10 years starts and finishes. This is highly conservative, and will result in more than 10 years of monitoring, with only years where two successful seasonal surveys implemented being counted. Addresses DES comment 3b.

Commented [YM42]: Note that survey guidelines informed the monitoring design

Commented [YM43]: Call playback has been found to have limited benefit, as explained in new paragraph below. Bravus will seek an amendment to the EA to allow this change, which has come from the research team implementing surveys.

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core BTF habitat and marginal BTF habitat. Input from the research team appointed to implement the BTF Research Program will be sought on the location of additional monitoring sites. The sites include areas outside of the disturbance footprint (control sites) and areas that will be subject to disturbance in the future (impact sites).

~~In the case of some monitoring methods, such as fixed point waterhole surveys, the exact location of these are known. However for some survey types, the placement of the permanent monitoring sites will be finalised during the implementation of the monitoring program. The BTF Management Plan will be subsequently updated to include the final locations of monitoring sites.~~

7.1.2.1 Water source watches

Water source watches are one of the primary survey methods recommended in the Significant Impact Guidelines for the Endangered Black-throated Finch (southern; *Poephila cincta cincta;* DEWHA, 2009a; the Guidelines). They have also been the most successful survey technique in recording BTF across the Project Area in most surveys undertaken to date.

Fixed point water source watches will be conducted for ~~six~~ three continuous hours commencing from ~~dawn~~ 9 am at up to 16 water sources where BTF have been previously recorded (**Table 12**~~**Table 12**~~ and **Appendix B**). Note that some of the sites have been found to be unsuitable for monitoring at times in the past, due to an absence of water. As water sources are removed as a result of mining activities, monitoring at these locations will cease. New water sources will be substituted for monitoring, particularly in the offset areas.

Where BTF are observed during water source~~hole~~ watches, the following information will be collected:

- Time of observation
- Number of individuals
- Other species present in mixed flocks
- Behaviour (e.g. foraging, drinking, perching, flying, etc).

Table 12~~**12**~~ **Water source monitoring sites (those sites marked # have been found to have little to no water during monitoring over the past three years)**

~~Site ID~~	~~Site Common Name~~
~~CWAT01a~~	~~Ten mile bore dam (lower)~~
~~CWAT01b~~	~~Ten mile bore turkey nest~~
~~CWAT01c~~	~~Ten mile bore dam~~
~~CWAT02~~	~~16 mile tank dam~~
~~CWAT03~~	~~Ten mile tank dam~~
~~CWAT07~~	~~Number 1 dam~~
~~CWAT99~~	~~Four mile bore~~
~~CWAT101 #~~	~~Beenboona hole~~
~~CWAT104 #~~	~~Unnamed waterhole~~
~~CWAT105 #~~	~~Rocky Dam~~
~~CWAT110~~	~~Lignum yards dam / trough~~
~~CWAT111~~	~~Lignum large dam~~

Commented [YM44]: Updated text and map in Appendix B to show actual sites established

Commented [YM45]: Points have now been established.

Commented [YM46]: Changed from 6 am for 6 hours, to 9 am for 3 hours, to be consistent with EA and OAMP. Implementation has revealed that most sightings occur in the period 9 am to 12 noon.

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Commented [YM47]: Site names have been clarified with monitoring teams past and present, and updated accordingly. Databases will be updated for sites where site IDs have changed, so that data is consistent among sites.

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~~CWAT116 #~~	~~New Laguna dam~~
~~CWAT117~~	~~Number 2 dam~~
~~CWAT118~~	~~Carmichael bore tank and troughs~~
~~CWAT120~~	~~Dingo dam~~
Site ID	**Site Common Name**
CWAT01a	Ten mile bore dam (lower)
CWAT01b	Ten mile bore turkey nest
CWAT01c	Ten mile bore dam
CWAT01d	Ten mile bore .....(west)
CWAT02	16 mile tank dam
CWAT03	Ten mile tank dam
CWAT07	Number 1 dam
CWAT99	Four mile bore
CWAT101	Beenboona hole
CWAT104	Un-named waterhole
CWAT104a	Lignum East
CWAT105	Rocky Dam
CWAT300	Lignum west bore
CWAT110	Lignum south bore
CWAT111#	Lignum large dam
CWAT116	New Laguna dam
CWAT117	Number 2 dam
CWAT118	Carmichael bore tank and troughs
CWAT120	Dingo dam

Land access to Lignum Dam has been difficult and inconsistent over the years of monitoring.

Characteristics of the water sources that BTF are observed utilising will also be noted in order to build on the existing understanding of use and utilisation of water sources. Any seasonal or longer term changes that may influence suitability for BTF will also be determined. The following information will be documented:

- Approximate size of water source
- Slope of bank
- Surrounding vegetation
- Water retention dynamics (permanent vs seasonal).

The quality of water and sediment at all water source monitoring sites will be assessed annually during the dry season survey, as follows:

Commented [YM48]: Further clarity on how often, where and what the water and sediment program will monitor.

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- Measurement of the following *in situ* water quality parameters using a calibrated water quality meter: Temperature, Dissolved Oxygen, Turbidity, pH, Electrical Conductivity
- Collection of a water sample for subsequent analysis of total metals (15 metals suite) at a NATA accredited laboratory
- Collection of a sediment sample for subsequent analysis of metals (15 metals suite) from the <2 mm fraction (sample to be sieved and analysed in the laboratory) at a NATA accredited laboratory. Sediment sampling does not apply to water sources that do not contain sediment (e.g. cattle troughs).

The results of water and sediment monitoring will build an understanding of the quality of water that is utilised by BTF, and provide information on whether such values are being maintained through the development and operation of the project.

7.1.2.2 Active searches

Active searches are to be conducted within suitable habitat to collect BTF population data and search for nests (**Appendix B**). In particular these surveys will focus on areas that are known to be good quality habitat for BTF as well as areas of habitat within the offset area.

Active searches will include random meanders within 1 km of each water ~~point monitoring~~source watch site for at least three continuous hours from dawn to 9 am, immediately prior to the water source watch at that location. S~~ with s~~pecific active search effort will be devoted to areas with grassy open-woodland habitat. 1 km transects will also be undertaken during active searches.

Commented [YM49]: Method updated to be consistent with OAMP method, based on feedback from ecologists implementing the surveys.

Information collected during active searches will include:

- Location and quantity of BTF
- Behaviour (e.g. foraging, drinking, perching, flying, etc)
- Regional Ecosystem (RE) type and condition
- Presence / absence of mixed-flocks and associated species
- BTF nests (including photographic evidence and GPS location)
- Characteristics of BTF nest including host tree or shrub species, height of nest, active or inactive
- Groundcover measurements of perennial grass cover, non-native grass cover, litter, bare ground and ground cover composition.

Wherever possible, the active search information collection methods will be similar to previous annual BTF vegetation assessments, in order to increase the data comparison value.

7.1.2.3 1 km transects

Commented [YM50]: Clarification of 1 km transect method, as previously this was not clear as grouped in with active searches.

At 1 km transect sites (**Appendix B**), a slow walk will be implemented along the length of a pre-determined 1 km linear transect, searching for BTF and BTF nests. Wherever BTF or a BTF nest is detected during a slow walk along the linear transect, the observer will move to the location of observation (also recording the details of the sighting) and the perpendicular distance from the transect midline to the observation will be measured in accordance with the DISTANCE sampling method (Buckland *et al*. 2005). The observer will then move back to the transect line and recommence the transect at the point the record was made. Wherever BTF or a BTF nest is detected, the following information will be recorded:

- Location and quantity of BTF
- Behaviour (e.g. foraging, drinking, perching, flying, etc)

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- Regional Ecosystem (RE) type and condition
- Presence / absence of mixed-flocks and associated species
- BTF nests (including photographic evidence and GPS location)
- Characteristics of BTF nest including host tree or shrub species, height of nest, active or inactive
- Groundcover measurements of perennial grass cover, non-native grass cover, litter, bare ground and ground cover composition.

~~7.1.2.3~~7.1.2.4 Slow-drive transects

Slow-drive transects have been undertaken throughout BTF habitat during some previous monitoring surveys. The technique involves using a vehicle driving at a maximum speed of 20 km/hr along a 3 km predefined transect ~~(**Appendix B**). Where BTF were observed, the following information was collected:~~

~~Location and quantity of BTF~~

~~Behaviour (e.g. foraging, drinking, perching, flying, etc)~~

~~Regional Ecosystem (RE) type and condition~~

~~Presence / absence of mixed-flocks and associated species.~~

Commented [YM51]: Deleted this detail as no longer implemented.

However, slow-drive transects have been found to be of limited value in previous surveys in the Project Area, and will not be continued as part of the ongoing monitoring program.

~~7.1.2.4~~7.1.2.5 Incidental observations

Opportunistic incidental sightings of BTF are to be undertaken whilst travelling between survey sites. Where BTF are observed, the following information will be collected.

- Location and quantity of BTF
- Behaviour (e.g. foraging, drinking, perching, flying, etc)
- Regional Ecosystem (RE) type and condition
- Presence / absence of mixed-flocks and associated species
- Assessment of groundcover characteristics and species composition
- BTF nests (including photographic evidence and GPS location)
- Characteristics of BTF nest including host tree or shrub species, height of nest, active or inactive.

~~7.1.2.5~~7.1.2.6 Remote cameras

Commented [YM52]: Notes added to clarify that camera monitoring is incidental (additional tool to detect BTF) rather than at fixed sites each time.

Fixed remote cameras will be set-up at water sources where water source monitoring is not undertaken. In particular these will be used to monitor cattle troughs as well as any new watering points installed throughout the Project Area and including the Moray Downs West offset area. The locations of camera monitoring may vary among surveys. Cameras will be installed for the duration of the monitoring surveys. Photos and recordings of BTF are to be included in the survey results.

~~7.1.2.6~~7.1.2.7 Vegetation assessments

Vegetation transects ~~will be~~have been established throughout the Project Area to monitor the condition of BTF habitats (**Appendix B**). Foraging plots will also be conducted during BTF monitoring in locations where BTF were identified foraging in order to identify the floristic characteristics of habitat and flora species foraged.

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Vegetation transects

Vegetation transects ~~will~~ consist of a modified BioCondition survey with indicators that are not important to BTF excluded (such as fallen woody debris). Fixed 100 m x 50 m vegetation transects ~~will be~~have been established and will be monitored throughout the Project Area with the following information recorded in regards to vegetation structure:

- RE
- Canopy species and relative abundance
- Canopy minimum, maximum and average height
- Crown cover
- Shrub species and relative abundance
- Shrub average height
- Shrub canopy cover
- Weed cover
- Ground cover
- Ground layer species and individual percentage cover
- Percentage cover of bare ground and organic material.

Foraging plots

2 m x 2 m foraging plots will be undertaken at locations where BTF are observed foraging. These plots will aim to determine important grass species for BTF in the Project Area as well as seasonal dietary variation. Flora plot information to be collection at each plot will include:

- RE
- Ground cover species including abundance (number of the whole), of each ground cover plant species including exotic and weed species, whether seeding, or not and whether dead or alive
- Cover of each ground cover species
- Total cover of ground cover species
- Bare ground cover
- Forb cover
- Litter cover
- GPS coordinates and geo-referenced photos.~~-~~

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~~7.1.2.7~~7.1.2.8 Groundcover, species composition and biomass monitoring

Monitoring of groundcover and species composition will be undertaken to assist with the management of grazing to maintain and enhance BTF habitat values. Baseline groundcover and composition have been established, as described in **Appendix F**. If annual vegetation assessments demonstrate a loss of native perennial species number and cover, an investigative review will be completed and relevant corrective management actions will be determined to ensure the maintenance of these species. An increase in invasive species such as Buffel Grass will also be a trigger for investigation. Corrective actions may include additional fencing or spelling of paddocks to control grazing, controlled grazing to reduce biomass levels, pest control (e.g. rabbits, weed eradication) and fire management.

Groundcover biomass monitoring will be conducted late in the wet season and completed ~~in~~ no later than the end of May each year within 2 ha sites at the following monitoring locations (**Appendix B**):

- CHAB02, CHAB03, CHAB22, CHAB23, CHAB24, CHAB25, CHAB37, CHAB45, CHAB47, CHAB48, CHAB52 (Open cut disturbance areas) and
- CHAB01, CHAB04, CHAB05, CHAB09, CHAB10, CHAB44 and CHAB46 (Underground disturbance areas).

These sites were originally monitored during the Project EIS.

Vegetation assessments will use amended methodologies described within 'Report for Black Throated Finch On-site Monitoring Survey' dated 1~~7~~2 ~~July~~ October 2013 to assess groundcover and ground composition based on Queensland BioCondition Framework (Eyre *et al.* 2011) and the Queensland Herbarium flora survey methods (Neldner *et al.* 2005). A total of 10 quadrats (1 m x 1 m) will be utilised along the transect, to provide an adequate representation of the site. Annual vegetation assessments will be reviewed and modified in line with approved Mine Plan changes and improved assessment methodologies. Monitoring will also focus on identifying potential increases in exotic grass composition, such as Buffel Grass.

Groundcover biomass monitoring will also be conducted at representative sites across the offset area. Monitoring will be conducted to determine the biomass and composition of groundcover and appropriate management requirements to optimise BTF habitat values, including specific cattle grazing practices to manage pasture biomass.

In December 2013, ecological equivalence assessments were conducted of the mine area in order to determine baseline condition of impact areas and inform the suitability of offsets (ELA 2014). That report described habitat quality as defined within the Offset Assessment Guidelines under the EPBC Act Environmental Offset Policy. Potential habitat and quality of that habitat were mapped for BTF and guided the establishment of future management objectives for offsets.

In the Moray Downs West Offset Area, and in all paddocks of the project area that contain BTF habitat, the use of strategic grazing ~~within offset management areas~~ will be guided by biomass monitoring. B~~In the Moray Downs West Offset Area, b~~iomass monitoring will be undertaken twice a year, at the end of the wet season (approximately ~~April~~May) and at the end of the dry season (approximately October) using the Department of Natural Resources, Mines and Energy Queensland GRASS Check – Grazier Rangeland Assessment for Self-Sustainability DNRQ97002, Second edition-revised methodology. Monitoring will be undertaken at monitoring sites established as part of the baseline surveying in year 1 (Moray Downs West Offset Area) and as subsequently established across the project area in the following year. Monitoring ~~events~~ in October will assess ~~pasture composition,~~ pasture biomass and pasture ground

Commented [YM53]: Changed to allow greater flexibility for climatic variables

Commented [YM54]: Bravus would like to use 10 quadrats per transect, rather than 5 quadrats as outlined in the BioCondition method. Minor addition here to note that this additional data collection is consistent with the plan.

Commented [YM55]: This paragraph amended to address DES comment 2c, that biomass monitoring should be extended to all BTF habitat, not just the offset area.

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cover, including an assessment of ground cover of perennial grasses collectively (not by species). These assessments will be used to set stocking rates for the dry season for any strategic grazing to reduce fuel loads or for weed control. Strategic grazing implemented ~~within Moray Downs West Offset Area~~ will aim to retain a biomass of 1,500 kg/ha at the end of the dry season.

Commented [YM56]: Consistent with DES advice at last review in April 2021.

~~7.1.2.8~~7.1.2.9 Bioacoustic monitoring

Bioacoustic Audio Recorders (BARs) have been successfully implemented during BTF surveys of the Project Area in 2017 and 2018 (E2M 2017, 2018). A pilot study was undertaken in 2017 with the objective of developing a recogniser to facilitate automated recognition of BTF calls using Sound ID software.

Two different BTF calls were identified, of which one call was found to be suitable for automated recognition. The pilot study found that automated recognition of BTF calls was a viable method to detect BTF presence, particularly for sites that are impractical to monitor by an ecologist due to the scarcity of BTF use or their remote location. The method had a 69% detection rate of the most characteristic BTF call. However, in approximately 50% of BTF occurrences, BTF did not produce their characteristic call and were therefore not present in acoustic recordings. The method detected 33% of all BTF occurrences recorded by ecologists (including occurrences where BTF did not call).

Following the pilot study for the automated recognition of BTF calls, BAR devices were again deployed during a 2018 survey. BAR devices were used to detect BTF presence/absence at water sources that would otherwise have not been monitored and where remote cameras were not an adequate means of detection. Acoustic data was screened for BTF calls using a combination of automated recognition with manual verification.

BARs will continue to be used as a survey method, with a focus on remote survey sites or locations where other survey techniques are not likely to be an adequate means of detection.

7.1.3 Impact monitoring actions and outcomes

The monitoring will also aim to determine the effectiveness of mitigation measures implemented for management of BTF in the Project Area. The potential impacts of the proposed activities on BTF will be monitored in accordance with the monitoring program outlined in **Tables 8 to 10**, which has monitoring tasks specifically linked to corrective actions.

7.2 Research program

The objectives, indicators and actions for BTF research across the Project Area and the broader area will be undertaken in accordance with the Carmichael Coal Mine BTF Research Program (ELA 2017b; see **Appendix C**) which is summarised in the following sections.

The objective of the Research Program is to determine critical ecological requirements for the BTF in accordance with the conditions of approval for the mine development. In particular the research will aim to identify the movement patterns, habitat requirements and population dynamics, dietary requirements, home range and nesting requirements for the BTF as well as the relationship between water sources, woody habitat and food sources.

The research will also aim to determine the species response to grazing management, fire management and water body locations within the mining lease area and approved offset areas to facilitate appropriate management of these areas. Specific grazing trials will be proposed via the Research Program. The location and timeframe of the trials will be determined at the scoping phase of the research. Further detail is outlined in **Appendix C**: BTF Research Program. Population estimates will also be improved, particularly for key sites such as Ten Mile Bore.

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The results of the research will inform and improve management and mitigation measures adopted for the Project to minimise impacts to the local population of BTF as well as enhance habitat within the Moray Downs West offset area in such a way to increase the carrying capacity for BTF in these areas.

7.2.1 Grazing management

BTF can persist in pastoral landscapes even though Maute (2011) demonstrated that birds on pastoral lands had higher stress levels than birds on conservation lands. The abundance of BTF and the viability of their populations, however, are likely to be influenced by the actual grazing regime including stocking rates, land management practices and paddock rotation. The key impacts of grazing are on the composition and structure of the ground layer.

By determining the composition and structure of the ground layer where BTF are known to breed and forage within the Project Area, grazing trials can be implemented within other areas of *Eucalyptus melanophloia* open-woodland that the species appears to utilise less frequently to use grazing as a tool to establish similar composition and structure characteristics which may encourage BTF breeding and foraging. Controlled grazing may also be a suitable means for improving habitat by thinning areas of very dense grass cover as well as assisting in managing bushfire risks. These trials will aim to identify appropriate grazing strategies for managing BTF habitat, especially within the Moray Downs West offset area.

Grazing trials will consist of various cattle stocking densities and wet season resting. These trials will be assessed in terms of the ground layer composition and structure with reference to areas of known high value BTF habitat in the Project Area. The trials will aim to identify the optimal grazing strategy for maintaining good condition BTF habitat that incorporates important food resources including diversity and cover of preferred grass species as well as adequate seed output.

Proposed research methods for this aim are provided in **Appendix C**.

Grazing management activities on Moray Downs have coincided with areas of high value BTF habitat. Grazing management changes will be based on management, monitoring and research to understand the dynamics between a number of land activities and threats which will be concurrently managed. It is important that the management of this area is undertaken with regard to weeds, fire, seeding and seasons.

Feedback on this BTFMP included consideration of stocking rates associated with a low impact grazing regime. Through the delivery of the BTF Research Program, a greater understanding of the impact and influence of stocking rates on habitat quality will be realised and then be implemented through management actions.

7.2.2 Fire management

Fire is inevitable in the grassy woodlands of central Queensland and a natural component of these ecosystems. European settlement has caused a shift towards frequent, extensive and high intensity fires in the dry season resulting in large uniform areas (Rechetelo 2016). Fire will generally not reduce densities of canopy tree densities, though it can change canopy structure. The most notable impact of fire on BTF habitat is through modification of the ground layer.

While it is apparent that BTF will forage on recently burnt country, it is not known how the fire regime affects the resources available to the birds. Inappropriate fire regimes can impact on the quality of BTF habitat by affecting the production of seeds, reducing the cover and diversity of grass species and causing a decline in food availability. Fire exclusion can lead to thickening of woody shrubs, decreasing the quality

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of BTF habitat. Therefore high frequency, low intensity, patchy fire regimes may be beneficial to BTF by reducing the thickness of the shrub layer (Russel-Smith *et al*. 2001).

This research will include a detailed analysis of fire history across the Project Area to ascertain the frequency and intensity of fires within BTF habitat across the Project Area. Trials will then be considered for implementation and include various regimes of fire frequency and inter-fire interval, fire intensity, the season in which fires occur and the extent (area) of individual fires. However, any fire management trials will need to consider other management strategies and BTF research methods as well as safety and asset protection.

Proposed research methods for this aim are provided in **Appendix C**.

7.2.3 Water sources

BTF need to drink water on at least a daily basis and drink more frequently during the drier times of the year. The importance of water to BTF is highlighted by the fact that they typically nest and breed near water. Within the Project Area this is demonstrated with 68% of BTF records in grassy woodlands within 3 km of known water sources. Therefore the absence of water may preclude BTF from areas that otherwise provide suitable habitat. The addition of water may increase the area of suitable habitat that is available.

BTF surveys and monitoring within the Project Area have also identified the species' ability to utilise natural and artificial water sources. During these surveys they have been regularly observed to drink from cattle troughs, dams and 'turkey nests'.

A key management strategy for the Moray Downs West offset area is to provide additional water sources within areas of suitable woodland habitat for BTF. They will be installed throughout the offset area at locations greater than 3 km from existing water sources.

Artificial water sources will initially be installed in several locations of the Moray Downs West offset area. Research will assess the response of BTF to new water sources and the effectiveness of this strategy by identifying the following:

- Ability to attract BTF
- Frequency of use by BTF
- Change in usage of nearest water sources
- Proximity to existing vegetation especially trees / shrubs

Proposed research methods for this aim are provided in **Appendix C**.

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8 Discussion

8.1 Summary of key management issues

The following management approaches will be implemented to minimise impacts of the Project on BTF:

- Pre-clearance surveys to confirm the area of habitat to be disturbed, identify BTF locations not previously recorded in the Project Area and monitor compliance with disturbance limits.
- Vegetation clearing protocols to include staged and sequential clearing of BTF.
- Minimise impacts to BTF breeding by avoiding and buffering known nests and also avoiding vegetation clearing as much as possible during the breeding period (October to ~~April~~May).
- Fire management to prevent accumulation of fuel loads leading to uncontrolled wildfires. Controlled cool burns will be undertaken in accordance with the Fire Management Plan (Adani 2015) to provide a mosaic of fire history and to prevent thickening of the shrub layer in BTF habitat.
- Weed management to prevent the introduction and / or spread of weeds that have the potential to degrade BTF habitat.
- Control and monitoring of pest species, especially predatory species, such as cats, that may impact on BTF.
- Prevent contamination of watering points by bunding fuels and chemical storage areas and buffering these areas from known watering points, waterbodies and waterways. Erosion and sediment controls will be implemented to prevent run-off of materials.
- Use of spotter-catchers before and during clearing activities to mitigate the direct impacts of construction activities on wildlife and record and report fauna mortality and injuries.
- Limit disturbance to pre-defined areas and implement controls to minimise noise, lighting, vibrations and dust.
- Rehabilitate areas that are to be disturbed, to restore habitat values where practicable. Monitor the effectiveness of rehabilitation activities.
- Seasonal monitoring of BTF within the Project Area to identify population trends and important breeding and foraging habitat.
- Monitor the direct and indirect impacts of construction and operations on threatened communities and species (and their habitats), both within and adjacent to the Project Area.
- Evaluate the effectiveness of mitigation measures, and revise them if necessary to improve environmental outcomes.

The BTF Management Plan will be implemented in conjunction with several other management plans specific to threatened species, habitats (groundwater dependent ecosystems) or threats (pest management plan). Collectively, the management plans will achieve a high standard of environmental management.

8.2 Implementation

Responsibility for implementing the BTF Management Plan will lie with ~~Adani's~~the Bravus Head of ~~Environment~~ Health, Safety, Environment and Community (HSEC)~~and Sustainability~~. Mitigation and management measures will be incorporated into site management procedures and the scope of relevant construction activities. Some management tasks described in the management plan will be completed directly by ~~Adani~~ Bravus staff, while other tasks may be contracted out to consultants or contractors. Where the support of contractors is required, services will be procured through the~~Adani's~~ purchasing

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procedures of Bravus. Monitoring and research programs will be implemented by suitably qualified environmental suppliers, as described in **Section 9.3**.

~~Adani~~ Bravus recognises the importance of taking a whole-of-ecosystem approach to the implementation of this plan and the minimisation of environmental impacts, including BTF, arising from the Project. During implementation of this plan, and in particular at the construction planning stage, ~~Adani~~ Bravus will take the following approach to increasing the effectiveness of the management plan:

- Identify locations where multiple BTF habitat values require management and / or monitoring, and ensure such measures are effectively implemented in parallel.
- Give consideration to the management of environmental impacts for all threatened species (at an ecosystem scale), rather than particular species in isolation.
- Maintain awareness of the changes in the vulnerability of threatened species during different seasons. In particular for the BTF, the breeding season is a critical period to maintain a sustainable local population in the Project Area.

A table showing key events in the annual implementation of the BTFMP is provided in **Table 13**~~Table 13~~.

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Table 131315 Key events in the annual implementation of the BTFMP

Activity	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Wet Season BTF Survey												
Dry Season BTF Survey												
Water quality assessments												
Vegetation assessments												
Groundcover assessments												
Submission of Annual Report												
BTF Breeding Season												

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9 Reporting and Compliance

9.1 Updating this plan

Implementation of this BTF Management Plan will commence immediately from the date of its approval by ~~DoE~~ DAWE and DES. The plan will be reviewed annually from commencement.

The annual review of the BTF Management Plan will include consideration of:

- delivery and outcomes of any Bioregional BTF Management Plan, including that led by the Queensland Government under the Coordinator-General's Report about the project;
- relevant requirements under the EPBC Act 1999, including the BTF Recovery Plan, conservation advices and threat abatement plans; and
- any amendments to the above or as required in response to outcomes of research, monitoring and management actions.

Further details of the annual review process are provided in **Section 9.2**.

An adaptive management approach will be taken, considering documented impacts of management activities and the results of the approved research and monitoring program. Feedback from the monitoring program that indicates mitigation and management measures are not meeting targets will trigger a review of the relevant goals, performance criteria and triggers to ensure that they are adjusted in response to suit the results of the monitoring program.

Within 5 years of the BTFMP, ~~Adani~~ Bravus will revise and amend Tables 8 to 10 to include:

- the presentation of anticipated impacts on the BTF population from all stages of the project and detail measurable management and mitigation options
- performance criteria measured on the proposed impacts on the BTF population and habitat within the project area
- adaptive management triggers that are supported by statistical analysis demonstrating when significant changes in BTF population, threats and habitat condition are reached
- monitoring that is linked to change in BTF population sizes as well as changes in BTF habitat condition. Triggers and responses that are coupled to each management action.
- ~~D~~detail how the research program will inform monitoring to determine whether the management of habitat and impact management is on track to deliver benefits to the BTF population and BTF habitat
- ~~I~~include a rehabilitation mitigation measure that the research program will establish the plant species that provide critical food resources to BTF during seasons of seed shortages. Mitigation will include rehabilitation planning to commence a propagation program of these plant species and the development of management knowledge to ensure that revegetation of BTF habitat using these critical species will be optimised to target successful outcomes.

Updates to the management plan will be made in consultation with DAW~~e~~E and DES. Revisions of the survey and monitoring program will be carried out in consultation with the BTF Recovery Team, in accordance with Condition I7 of the EA.

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If pre-clearance surveys identify habitat for BTF not previously identified and reported to DAWoE and DES, ~~Adani~~ Bravus will notify the Departments in accordance with requirements in project conditions.

Work that has the potential to generate new and/or unapproved impacts to BTF must cease until the updated management plan has been considered by DAWoE. The updated management plan will detail how impacts to the newly identified communities will be avoided, mitigated and/or offset. Once approved, the revised management plan will be implemented.

9.2 Reporting

~~Adani~~ Bravus will prepare an annual report on 1 July each year and will be made available to the administering authority for the *Environmental Protection Act 1994* on request. The reporting period will be 1 June to 31 May each year, allowing one month to prepare the annual report. The annual report will summarise the activities implemented under the plan, and discuss the effectiveness of mitigation measures, based on the results of monitoring activities. All items in relevant compliance tables of this plan are to be addressed in the annual report, using a standardised template. The results of research and monitoring activities will be used to inform an annual reassessment of project risks on BTF, as part of the annual reporting process. This assessment will consider the following:

- Has new information become available about vulnerabilities of BTF to project impacts?
- Are mitigation measures still considered to be appropriate, given new knowledge gained through research and monitoring?
- What adaptive changes to mitigation and monitoring measures are recommended on the basis of new information collected during the past 12 months?

Examples will be provided in the annual report of how the adaptive management process has been applied during the past 12 months. For all instances involving a corrective action being implemented in response to a trigger being reached, the timeliness of the corrective action's implementation will be discussed, consistent with the objective of implementing actions as soon as possible and in a timely manner. Amendments to the BTFMP will be made as a result of any identified improvements.

In accordance with Condition I7 of the EA, the BTF Management Plan will be reviewed annually by an appropriately qualified person, with findings included in the annual report. The independent review will:

- Assess the plan against the following requirements of Condition I6 of the EA:
  - A baseline research program on the specific nesting and feeding requirements of the species that will be undertaken prior to and during project stage 1
  - A baseline research program to establish whether the BTF at the project site are sedentary, locally migratory or regionally migratory
  - A description of how the results of baseline research are to be used to determine any changes of classification of and/or impact on BTF habitat
  - Details of proposed impacts to BTF habitat from each project stage including impacts from clearing, subsidence, ecological function changes, hydrological changes and weed and pest infestation changes
  - Mitigation measures to be undertaken to avoid, mitigate and manage impact resulting from each stage of the project, including rehabilitation of habitat
  - Monitoring of watering points that must be conducted for a minimum ~~six~~ three (~~3~~6) hour period commencing from ~~dawn~~9 am, to accurately capture BTF utilisation of water points
  - Detailed botanical assessment that must occur at all BTF sighting locations in the Project Area to record habitat values at those locations

Commented [YM60]: Annual report to systematically address all items in compliance tables, as per DES comment 5a

Commented [YM61]: New text on reporting on adaptive management, to address DES comment 4a. Also new text on the timeliness of implementing corrective actions – to be discussed for all incidences in the annual report. Addresses DES comment 8 in part.

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- Detailed survey that must occur across the mining lease area and approved offset areas and must include information on BTF movements. The survey method and effort must be sufficient to accurately describe the BTF home range and detail BTF resource usage patterns between seasons and years (for up to 10 years) and allow robust management actions to be developed for the maintenance of a viable local BTF population
- Survey work that should incorporate the usage of call playback and identify all birds present when BTF are encountered (call playback has been found to have limited success and may influence natural behaviour, and has therefore been discontinued)
- Specific surveys that must be undertaken during the BTF breeding season and include nest location and assessment of the habitat attributes associated with the breeding locations. The survey method and effort must be sufficient to accurately describe the BTF breeding requirements with consideration to spatial and temporal variation of resources of up to 10 years
- Survey and monitoring that must be undertaken by experienced ecologists.

- Include recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year
- Identify any amendments made to the BTF SMP following the review.

All revisions of the survey and monitoring program must be carried out in consultation with the BTF recovery team. Any revisions must be independently peer reviewed.

In addition, ~~Adani~~ Bravus will publish a report on its website addressing compliance with each of the conditions of EPBC 2010/5736, including implementation of the BTF Management Plan. The report will be published within three months of every 12 month anniversary of the commencement of the project, in accordance with the requirements of Condition 31 of EPBC 2010/5736. Details of the date of publication and any non-compliance with approval conditions will also be provided to ~~DoE~~DAWE.

~~Adani~~ Bravus will provide data to the Queensland Government for the purposes of informing the BTF Bioregional Management Plan.

~~Adani~~ Bravus will conduct periodic audits to monitor compliance with management plan commitments, in accordance with the ~~Adani~~ Bravus quality system. Management plans are randomly selected for an internal audit each year, with staff responsible for implementing the plan interviewed as part of the audit. All commitments in **Table 8~~Table 8~~** to **Table 10~~Table 10~~** will be included in the audit. ~~Adani~~ Bravus will integrate the management plan commitments with other aspects of the mine construction and operations, to avoid actions being overlooked. It should be noted that reporting timeframes outlined in this plan apply only to BTF.

This plan will be available to all employees, contractors and subcontractors. ~~Adani~~ Bravus will amend the management measures as necessary in response to regular reviews, monitoring results and changes in legislation, in consultation with regulatory authorities.

9.3 Qualifications

Persons implementing key tasks described in this management plan will have appropriate training, skills and professional qualifications relevant to their role and responsibility. BTF ecologists must be able to provide authoritative assessment, advice and analysis on performance relating to the BTF using the relevant protocols, standards, methods or literature. It is expected that suitably qualified personnel involved in the implementation, review and amendments to this plan will include an ecologist / ornithologist with recent field experience with the species and a knowledge of the habitat and ecological requirements of the BTF.

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Fauna spotter-catchers must have demonstrable identification and handling skills, and behaviour knowledge (including nesting requirements) relevant to the BTF, and all threatened fauna species that may, are likely, or are known to occur in the Project Area. Fauna spotter-catchers must be suitably qualified and working under a valid permit from DES.

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10 Commitments and actions included in this plan to be delivered by ~~Adani~~Bravus

~~Table 14~~~~Table 14~~~~Table 13~~ provides a register of key reporting, mitigation and monitoring commitments arising from this plan. This will assist ~~Adani~~ Bravus and its contractors to monitor progress with implementation of the plan. Aspects of the monitoring design that should be considered for BTF are described in **Section 7**. These will be taken into consideration by ecologists implementing the management plan.

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Table ~~14~~~~14~~~~13~~ Commitments and actions included in this management plan to be delivered by ~~Adani~~Bravus

Issue	Number	Commitment
Reporting and Notifications	1	Prepare an annual report ~~on~~ by 1 July each year and make available to the Administering Authority upon request.~~.~~
	2	Conduct periodic audits on compliance with this plan.
	3	Non-compliances with the BTF Management Plan will be identified and recorded through an auditing process.
	4	Work that has the potential to generate new and/or unapproved negative impacts to BTF must cease until the updated management plan has been considered by ~~DoE~~DAWE. The updated management plan will detail how impacts to the newly identified communities will be avoided, mitigated and/or offset. Once approved, the revised management plan will be implemented.
Mitigation	5	Use discretion in the placement of some infrastructure to avoid disturbance to BTF habitats and populations.
	6	Prior to the commencement of site works, any conditions listed in the "Permit to Disturb" will be implemented - e.g. clearing extents clearly marked, trees/areas requiring protection clearly marked, or barricaded. All BTF habitat clearing operations are to be monitored for compliance by a suitably qualified person.
	7	Undertake pre-clearance surveys prior to the commencement of clearing activities, to confirm and identify known areas of occurrence.
	8	Surveys of the area to be disturbed prior to and during construction are to be conducted by a fauna spotter-catcher in BTF habitat areas and remnant vegetation areas. Fauna to be recorded and translocated to suitable habitat adjacent to the disturbance area, where practical. Fauna deaths and injuries to be recorded and managed in accordance with relevant Permit Conditions (e.g. Rehabilitation (Spotter-catcher) Permit) and guidelines. BTF nesting areas observed in areas not to be disturbed will be marked and mapped and monitored during construction and operations works.
	9	Rehabilitate disturbed areas following construction activities where such activity does not compromise the ongoing operation of the project. Progressive rehabilitation of disturbed areas will be undertaken in accordance with the Rehabilitation Management Plan.
	10	Progressive rehabilitation of disturbed areas will be commenced as soon as practical after it has been confirmed that no further activities will occur in each area. Rehabilitation will generally commence within 6 months, unless it is considered more effective to align with the next wet season.
	11	Implement environmental offsets to enhance habitat values used by BTF.

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Issue	Number	Commitment
	12	Implement an induction program for staff and contractors about BTF and other threatened species, their habitats and identification. Use posters in prominent work locations to maintain awareness. Implement sound land management practices.
	13	Use directional lighting and strategic timing and placement of lights to minimise light spill into adjacent habitat.
	14	Ensure all plant and equipment is serviced and maintained to minimise machinery noise and vibration.
	15	Management of erosion and sedimentation will be undertaken in accordance with a Project Erosion and Sediment Management Plan.
	16	Mine-related wire and mesh material near water sources will be removed and/or covered to prevent entrapment, if practical
	17	Domestic animals will not be permitted into the Project Area apart from cattle (including horses and dogs during mustering activities).
	18	Monitor BTF populations and their habitats in areas where subsidence occurs.
	19	Weed and pest animal control will be implemented during construction and operations.
	20	Permanent water sources in retained habitat areas will not be drained during construction and operations, unless suitable alternative water supplies are available.
	21	Establish a low impact grazing regime in the vicinity of Ten Mile Bore for the purpose of ensuring the BTF habitat in this vicinity can continue to support a viable population of BTF, as described in Section 6.4.7.
Monitoring	22	Monitoring BTF populations and their habitats in areas where subsidence occurs.
	23	Monitor the presence and population abundance of invasive fauna.
	24	Measure the effectiveness of offset investments by monitoring the quality of offset areas.
	25	Any injured wildlife will be either taken to the nearest qualified veterinary practitioner or wildlife carer, or humanely euthanised on site by a suitably qualified person.
	26	Monitor dust level impacts on BTF habitat, and in water bodies within and adjacent to construction activities.
	27	Monitor water quality in BTF habitat, in accordance with the Surface Water Monitoring Plan.
	28	Annual monitoring (including photo monitoring) of water source availability, in the driest season, in known BTF habitat.
	29	Monitor the incidence of Project-related fire.
	30	Pre-clearance and annual BioCondition assessments and photo monitoring will be completed to determine the condition of retained BTF habitat in impact and control sites. Monitoring will be in conjunction with a research program to monitor remnant vegetation changes over subsidence areas.
	31	Measure the effectiveness of rehabilitation activities through BioCondition monitoring.

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Appendix A Overview of Project Management Plans

This section provides a summary of the EMP prepared to support an EIS process for the Carmichael Coal Project under the EPBC Act and SDPWO Act. The summary is intended to assist readers of the Species Management Plan understand the other management plans in place and how they relate to the management of threatened species and communities. The summary reflects the findings and recommendations of studies undertaken for the EIS. Further details of the management plans can be found at this link https://www.bravus.com.au/sustainability/environment/

~~http://www.adanimining.com/aeis-documents~~

Commented [YM65]: Update of website link

Each management plan covers design and construction requirements, operational activities and decommissioning. The management plans consider open cut mining, underground mining, mine infrastructure areas, out of pit waste rock dumps, mine water management dams, office, workshop and other facilities and power, water distribution and offsite infrastructure (e.g. worker's accommodation, airport, water supply infrastructure and road upgrades).

The overall project EMP provides details and implementation details for the following aspects: air quality, greenhouse gas emissions, noise and vibration, surface water, groundwater, mine waste management, general and hazardous waste management, terrestrial ecology, aquatic ecology, biosecurity management, scenic amenity, erosion and sediment control, contaminated land, soil resources, aboriginal cultural heritage, non-indigenous cultural heritage, subsidence management, emergency management and response and community. A summary of those plans most relevant to the protection of MNES is summarised below.

The project EMP is a working document and will be updated as required to reflect changes in impacts or mining activities, changes in legal and other obligations and changes from learning and corrective actions through monitoring activities.

Air quality

The management objectives for air quality include protection of biodiversity through avoiding nuisance from dust deposition and meeting EPP (Air) objectives for dust emissions at sensitive receptors. Particulate matter could affect fauna and plants through coating of plant leaves, making them less palatable for fauna and affecting photosynthesis.

Key measures include prevention of dust through planning and sequencing of exposed soils; stockpile design and stabilisation; suppression activities for coal stockpiles and haul roads, access tracks and work areas; and progressive rehabilitation or disturbed areas.

Dust generation will be monitored visually and through and corrective action applied where train loading is generating dust or dust lift off is travelling beyond the lease boundary.

Noise and vibration

The Noise and Vibration Plan aims to protect the qualities of the acoustic environment that are conducive to protecting biodiversity. Potential impacts are possible due to civil works during construction, increased traffic, pile driving, rock breaking, blasting and other mining related activities. In general most of these activities are not expected to affect sensitive receptors.

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Airblast overpressure monitoring will be undertaken at sensitive receptors during initial blasting activities as well as other mitigations and monitoring controls that are largely aimed at protection of acoustic quality for surrounding homesteads.

Surface water

The Surface Water Management Plan aims to ensure that Environmental values relating to aquatic ecosystems, stock and domestic use and cultural values are maintained and that discharge and overflow events are undertaken in accordance with the relevant conditions under an environmental authority issued by DES.

Contamination of surface water resources could result from release of mine affected water, wastewater generation and treatment, hydrocarbon leaks or skills, spoil disposal, release of sediments through clearing and earthworks, or draining of low quality water from existing farm dams.

A mine water management system will be implemented based on segregation of water streams into clean, dirty and mine affected streams. Clean water will be managed by diverting around disturbed areas or through the proposed mine in watercourse diversions. Dirty water will be directed to sediment dams to allow sediment to settle out. This water can then be used for dust suppression.

The key management actions to be employed in the prevention of surface water loss and contamination include:

- Prepare and implement a Water Management Plan in accordance with the guideline Preparation of Water Management Plans for Mining Activities
- Preparation and implementation of a Receiving Environment Management Plan including water quality objectives, trigger levels, monitoring and contingency procedures
- Design all watercourse crossings to maintain flow and minimise afflux where this may affect sensitive receptors;
- Design of infrastructure to appropriate standards based on relevant guidelines and all available data to minimise impacts to surface water
- Prohibition of construction water sourced from the Carmichael River
- Controls on design and construction of dams
- Controls for draining of farm dams
- Preparation and implementation of a Plan of Operations for Mine Affected Water and sediment dams, including monitoring and requirements and procedures for discharge

Monitoring will include surface water levels and quality across a network of monitoring sites with at least twelve months of baseline data.

Groundwater

This Plan aims to ensure that impacts on groundwater dependent ecosystems do not cause unacceptable or unapproved losses of biodiversity values including impacts to fauna habitat. Potential threats to groundwater include drawdown from dewatering activities and contamination from spills or leaks.

Key management actions to be employed in the prevention of impacts to groundwater include:

- Groundwater quality trigger levels
- Identify potential impacts before excavation to inform measures required in work permits prevent contaminated runoff through development and implementation of a Surface Water Management Plan
- Laydown and storage areas to be located away from creeks and rivers or sensitive receptors

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- On-going monitoring of groundwater levels and updates to models

Monitoring will include groundwater flows to the Carmichael River, groundwater levels and quality across a network of bores.

Pests and Weeds (Biosecurity Management)

Management objectives are to achieve no increase or spread of weeds beyond pre-development conditions as a result of project activities and no unapproved biosecurity management activities. The scope of activities under the plan includes 22 introduced plant species recorded during surveys of the Project Area, of which Parthenium and Prickley Pear are most significant. Eight introduced fauna species are also addressed, including the feral cat, pig, cane toad, dingo, house mouse and rabbit. The plan will manage potential environmental impacts from pests and weeds through vehicle movements, construction activities and ongoing operations. Proposed controls include the following activities:

- Mapping of weeds prior to commencement of construction activities
- Containment of food scraps in sealed containers
- Limitations on the movement of vegetation and soil waste
- Use of weed wash down areas for vehicles and equipment
- No domestic animals in the Project Area
- Feral animal control programs, if necessary.

There will be ongoing monitoring of pests and weeds throughout the Project Area, using baseline and reference sites.

Erosion and Sediment Control

A total of 19 soil types were identified within the Project Area based on geology, landform, native vegetation and soil profile features. It is important to reduce soil loss from the site for the management environmental values relating to both soil and water. Vegetation clearing, topsoil stripping, earthworks, and stockpiling will result in disturbance and exposure of soils to erosive forces from either overland flows of water or wind action. Soil loss reduces soil productivity and removes nutrients and organic matter. Sediment mobilised by overland flow can affect adjacent watercourses through increased turbidity, deposition of sediment on aquatic ecosystems, geomorphological changes and reduced water quality for other water users. Plan objectives are to avoid degradation of aquatic ecosystems and water supply values downstream as a result of sediment releases, and that topsoil resources will not be lost through erosion. Proposed controls include the following activities:

- Preparation of detailed erosion and sediment control plans for each aspect of the project
- Design stormwater systems to include sediment retention basins
- Locate infrastructure away from drainage lines and steep slopes, where ever practicable
- Where practical, schedule works to avoid wet conditions, or if in streams, outside times of flow
- Minimise the areas to be disturbed
- All disturbed areas will be revegetated or protected from erosion using suitable control measures

Monitoring activities will include the inspection of sediment control devices and stormwater systems, including diversion drains and outlets.

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Subsidence Management

The management plan objective is that a stable and sustainable landform is created over subsided areas which maximises opportunities for the subsided areas to support native vegetation and fauna. Waterways are important considerations when addressing the potential environmental impacts from subsidence. The Carmichael River is the regional drainage line in the area, and a 500 m buffer from subsided areas will be maintained on either side of the river. Potential impacts from subsidence include altered topography and drainage patterns, tension cracks in the ground surface and disturbance to the root zones of vegetation. Proposed controls include the following activities:

- Develop a detailed management plan in accordance with the mine Environmental Authority
- Design creek diversions around the open cut areas to remain functional after subsidence
- Establish monitoring locations including transects of topographical features and habitat values
- Exclude cattle from subsidence areas.

Monitoring activities will include regular inspections of subsided areas, vegetation health assessments, inspections of ponding in subsidence troughs and groundwater assessments.

Bushfire Management

The Fire Management Plan provides a framework and guidance for:

- Identifying, monitoring and prioritising the management of fire risk in the Operational Area
- Preventing bushfires and managing fires throughout the Operational Area
- Developing site-specific and/or activity specific fire management procedures across the life of the project.

The plan is focussed on an overarching strategy to identify, avoid, prevent, minimise and control bushfires. Specific measures are provided on how this will be achieved, and include mapping of relevant environmental features, maintain fire infrastructure (e.g. fire breaks) and levels of fire preparedness. The use of fire in environmentally or culturally sensitive areas is also discussed.

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Appendix B Location of Monitoring Sites

Commented [YM66]: All maps in this Appendix updated. Also monitoring site coordinates added.

The locations of monitoring sites are shown on maps on the following pages with monitoring site coordinates provided below in tables. The first map shows the location of water source watch~~hole surveys~~ sites, 1 km transects, vegetation (BioCondition) transect sites, ~~slow drive transects~~ (historic) and active search areas. The second map shows the location of CWAT01 sites at the Ten Miles Bore. The third map shows the location of 2 ha groundcover biomass monitoring sites~~, which will be monitored in no later than the end of May of each year~~.

Commented [YM67]: Discontinued method

Commented [YM68]: No need to say timing here. Its explained in methods section.

Water Source Watch Sites and Water Quality Monitoring Sites

Site Name	Easting	Northing
CWAT01a	423288	7575822
CWAT01b	423338	7575930
CWAT01c	423341	7575890
CWAT01d	423112	7575807
CWAT02	432877	7577311
CWAT03	428716	7577948
CWAT07	431186	7568219
CWAT99	427230	7565141
CWAT101	442026	7578782
CWAT104	418793	7572771
CWAT104a	441571	7547384
CWAT105	434497	7573194
CWAT110	439619	7542009
CWAT111	438056	7539282
CWAT116	435189	7575431
CWAT117	429082	7572104
CWAT118	436402	7551819
CWAT120	435358	7568893
CWAT300	439113	7546351

Vegetation Transect Sites

Site Name	Easting	Northing
VTS01	427320	7564912
VTS02	427475	7565766
VTS03	429358	7563184
VTS04	439316	7540581
VTS05	430891	7569687

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Site Name	Easting	Northing
VTS06	412643	7578106
VTS07	422631	7575899
VTS08	423480	7574432
VTS09	423818	7582630
VTS10	427316	7581761
VTS11	419515	7577876
VTS12	428761	7577757
VTS13	432877	7577311
VTS14	424774	7571899
VTS15	419526	7571999
VTS16	418527	7567099
VTS17	421830	7566349
VTS18	434834	7567034
VTS19	435823	7553062
VTS20	436996	7551824
VTS21	437441	7549662
VTS22	443699	7541731
VTS23	439310	7542437
VTS24	427181	7573079
VTS25	437765	7539653
VTS26	424555	7574963
VTS27	430357	7543994
VTS28	432848	7578563

1 km Transects

Site Name	Start Easting	Start Northing	End Easting	End Northing
1	428756	7556048	429228	7555166
2	419398	7567419	419856	7566541
3	419593	7577367	419252	7578307
4	423422	7582783	423407	7581781
5	428597	7578656	429596	7578700
6	432516	7578486	432131	7577563
7	436784	7549300	437778	7549406
8	429356	7571474	429747	7570553
9	426090	7574114	426523	7573213
10	423105	7574885	423440	7573943

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Site Name	Start Easting	Start Northing	End Easting	End Northing
11	422185	7575839	423151	7576102
12	424334	7576557	424691	7577491
13	424441	7571769	423459	7571578
14	420334	7574634	421332	7574572
15	433105	7566364	434034	7566734

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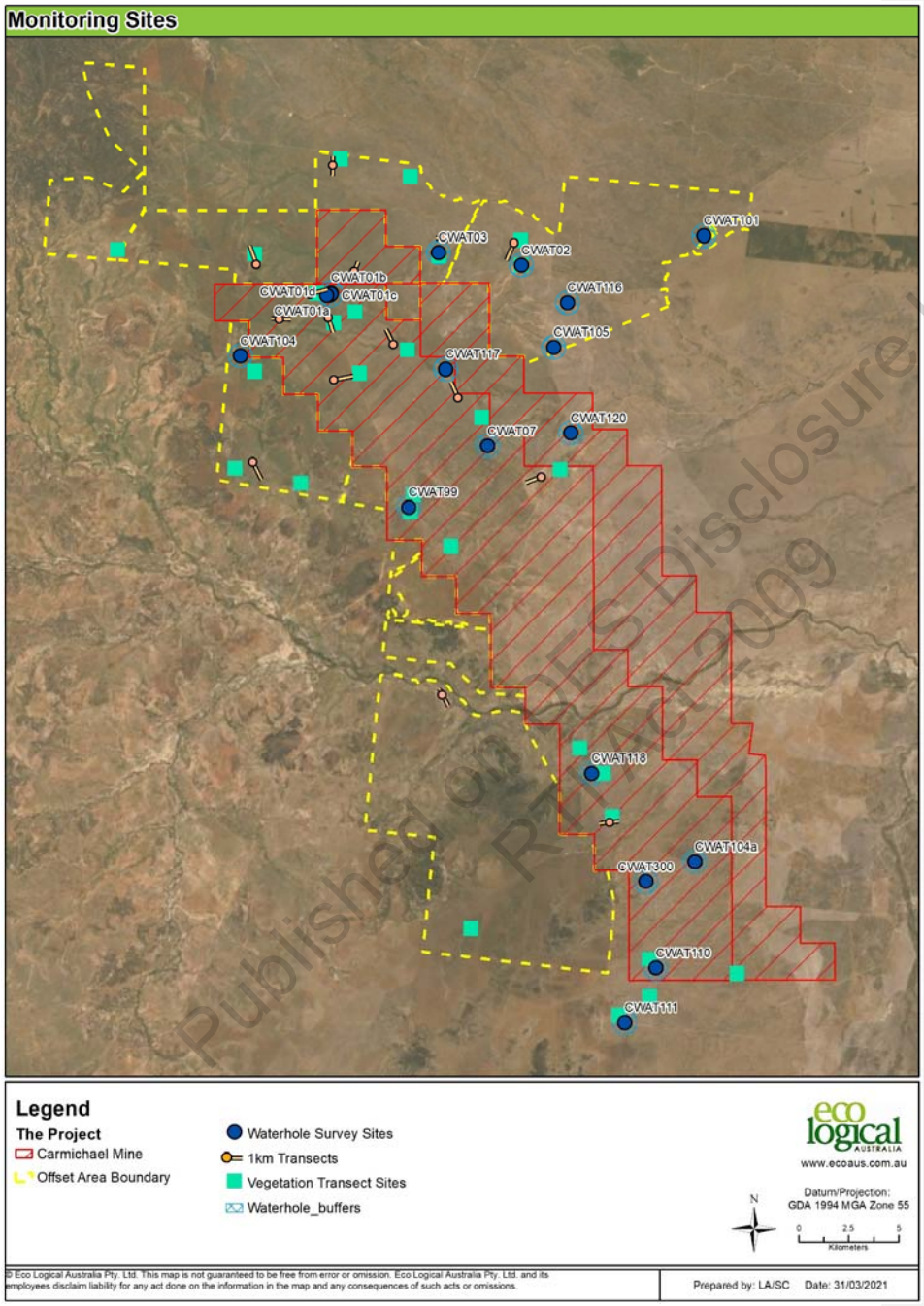

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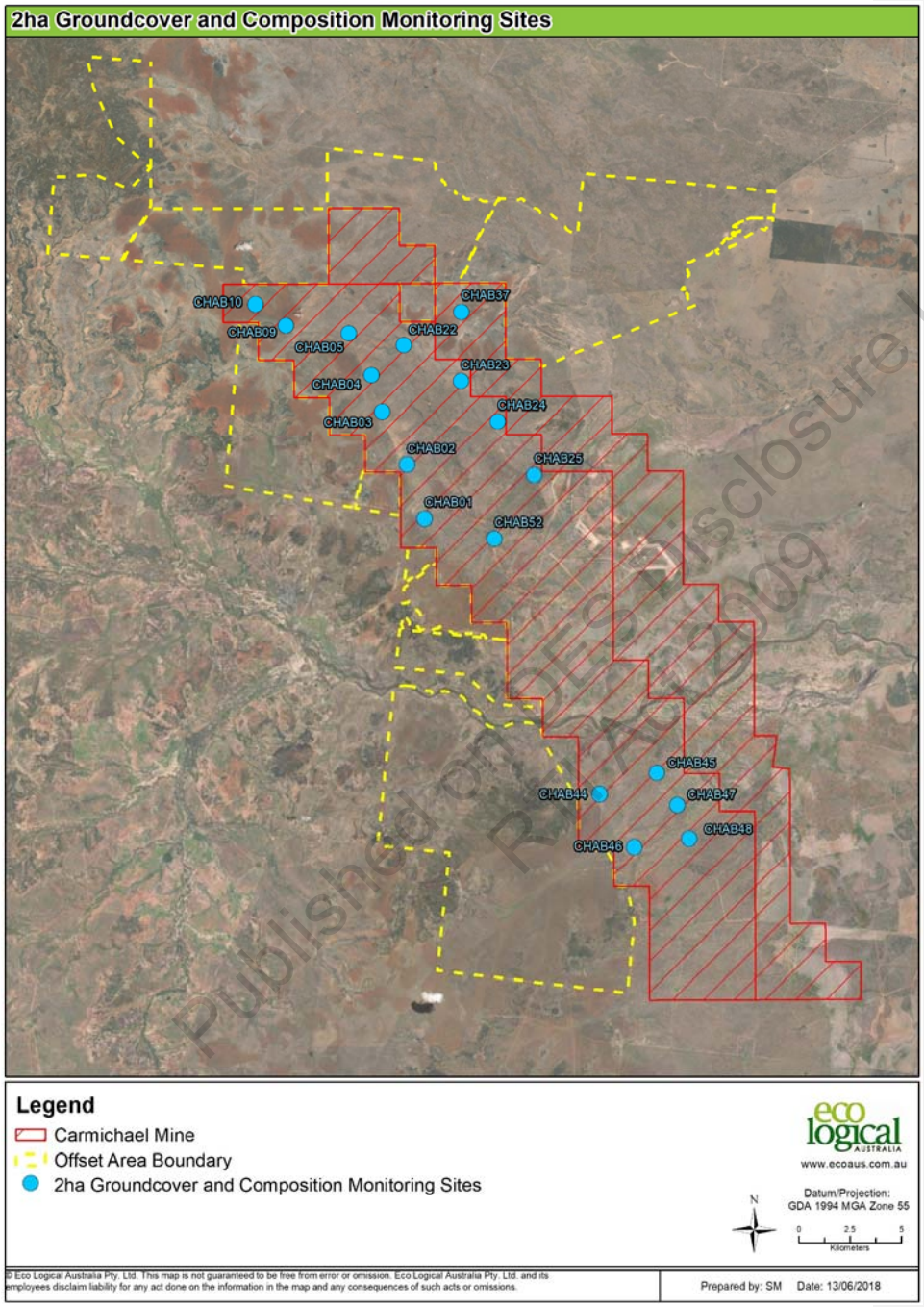

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Appendix C Black-throated Finch Research Program

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Appendix D Compliance with Approval Conditions

A table demonstrating compliance with relevant approval conditions is provided on the following pages.

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
EPBC Act Approval, condition 5	At least three months prior to commencement of mining operations, the approval holder must submit to the Minister for approval Matters of National Environmental Significance plan/s for the management of direct and indirect impacts of mining operations on (MNESMP). Note: If the MNESMP does not address any specific future activities (e.g. possible additional seismic surveys or specific mining stages) it should be updated in accordance with Condition 33.	The BTF Management Plan was lodged on 11 May 2017. This plan addresses the management of direct impacts of mining construction and operations on the BTF. Specifically, management actions of direct impacts are located in Table 8. This plan addresses the management of indirect impacts of mining construction and operations on the BTF. Specifically management actions of indirect impacts are located in Table 9 and Table 10. If this management plan does not address any specific future activities (e.g. possible additional seismic surveys or specific mining stages) it will be updated in accordance with condition 33 of the EPBC Act approval.	Section 6.3.3 (Table 8) Section 6.3.3 (Tables 9 and 10)	
EPBC Act Approval, condition 6	The MNESMP must be consistent with relevant recovery plans, threat abatement plans and approved conservation advices and must include:	This plan is consistent with the BTF Recovery Plan. Threats identified in the BTF Recovery Plan are addressed specifically in Section 4.6 and Table 4. These threats include clearing and fragmentation of vegetation, degradation of habitat by stock and pest species, alteration of habitat by fire regime, invasion by exotic weeds including grasses and predation by introduced predators. Potential project impacts are discussed in Section 4.6. Monitoring and research activities of the BTF Management Plan closely align with recovery objectives described in Section 5 of the BTF Recovery Plan (e.g. investigate breeding requirements, quantify distribution and abundance, investigate feeding and other habitat requirements). Further details of these measures are provided in Section 7 of the BTF Management Plan. There are 2 current threat abatement plan or conservation advices in force for the BTF that were considered in the development of this plan. These are with regard to: • competition and land degradation by rabbits (DEWHA, 2008) • reducing the impacts on northern Australia's biodiversity by the five listed grasses DSEWPAC (2012).	Section 3.4 Section 4.6 and Table 4 Section 7	
	a) A description of environmental values for each of the Matters of National Environmental Significance addressed in the plan	A description of environmental values for the BTF is provided in Section 4 of the BTF Management Plan. The description includes the status under Commonwealth and State legislation, regional populations, habitat requirements, breeding ecology, occurrence in the vicinity of the project area.	Section 4	
	b) Details of baseline and impact monitoring measures to be implemented for each of the Matters of National Environmental Significance including control and impact sites to be monitored throughout the life of the project. The monitoring must provide sufficient data to quantify likely impacts resulting from mining operations, including subsidence and changes in groundwater levels, to set habitat management goals (conditions 6e) and 6f)	A description of baseline and impact monitoring measures for the BTF is provided in Section 7 of the BTF Management Plan. The section describes the need for monitoring to occur prior to project commencement, as well as during construction and operations. The location of monitoring sites is provided in Appendix B, with control and impact sites to be established (Section 7.1.2). The monitoring will quantify impacts resulting from mining activities and provide feedback on the effectiveness of mitigation measures. The monitoring will include consideration of the impacts from subsidence, and groundwater draw down on BTF habitat values and water availability (see Section 7.1.2). Habitat management goals are set in Section 6.	Section 7, Appendix B Section 7.1.2, Section 6.	
	c) Details of potential impacts, including area of impact on each of the Matters of National Environmental Significance from mining operations, including impacts from:	Details of potential impacts of the project on the BTF are addressed in Section 4.6 of the BTF Management Plan. An area of impact is provided in relevant subsections of Section 4.6 for potential impacts for which a quantitative estimate can be provided (e.g. vegetation clearing and subsidence). Potential impacts are also discussed in Section 6 in the context of mitigation measures to minimise impacts.	Section 4.6, Section 6.	
	(i) Vegetation clearing		Section 4.6.1	
	(ii) Subsidence from underground mining, including subsidence induced fracturing and any changes to groundwater or surface water flow		Section 4.6.2	
	(iii) Mine dewatering		Section 4.6.8	
	(iv) Earthworks		Section 4.6.9	
	(v) Noise and vibration		Section 4.6.10	
	(vi) Emissions (including dust)		Section 4.6.11	
	(vii) Light spill and other visual impacts		Section 4.6.12	
	(viii) Stream diversion and flood levees		Section 4.6.13	

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
	(ix) Weeds and pests		Section 4.6.3 and 4.6.6	
	d) Measures that will be undertaken to mitigate and manage impacts on Matters of National Environmental Significance resulting from mining operations. These measures must include but not be limited to:	A description of measures that will be undertaken to mitigate and manage impacts on the BTF resulting from mining operations is provided in Section 6.	Section 6	
	(i) The use of fauna spotters prior to and during all vegetation clearing activities to ensure impacts on Matters of National Environmental Significance are minimised	All BTF habitat clearing operations will be monitored for compliance by a suitably qualified fauna spotter-catcher during clearing activities, to ensure impacts on BTF are minimised. The approach is outlined in Tables 7 and 8 of the BTF Management Plan and Section 6.3.2.	Table 7, Table 8, Section 6.3.2	
	(ii) Measures to avoid impacts on Matters of National Environmental Significance and their habitat located in the Project Area, but outside areas to be cleared, constructed upon and / or undermined, including adjacent to cleared areas	Measures to avoid impacts on BTF and their habitat outside areas to be cleared around described in Section 6.4 and Table 9 of the BTF Management Plan. They include matters such as the management of grazing, fire, water and pests.	Section 6.4, Table 9	
	(iii) Measures to rehabilitate all areas of Matters of National Environmental Significance habitat	Details of rehabilitation of disturbed areas are provided in Section 6.1 and Table 8 of the BTF Management Plan. Monitoring initiatives to determine the success of rehabilitation activities are described in Section 7.	Section 6.1, Table 8, Section 7.	
	(iv) Habitat management measures including but not limited to management of subsidence and groundwater impacts of the project	Mitigation measures for subsidence are provided in Table 8 and address subsidence. Table 10 provides details for mine dewatering.	Table 8 and Table 10.	
	e) Goals for habitat management for each relevant Matters of National Environmental Significance	Goals for habitat management of the BTF are provided in Section 6.4 of the BTF Management Plan. These include maintaining the three main habitat elements: woody layer of vegetation, herbaceous layer of vegetation and water sources. Factors affecting these values are also discussed (e.g. grazing and fire). Table 9 provides further details on how goals will be achieved.	Section 6.4 and Table 9	
	f) A table of specific criteria for assessing the success of management measures against goals, and triggers for implementing corrective measures if criteria are not met within specified timeframes. This table must include but not be limited to measures relating to subsidence and groundwater impacts, including early warning triggers for impacts on groundwater at the Doongmabulla Springs Complex and the Carmichael River. Goals and triggers must be based on the baseline condition of the relevant Matters of National Environmental Significance as determined through baseline monitoring (see Conditions 3b) and 6b)). Corrective measure must include provision of offsets where it is determined that corrective management measures have not achieved goals within specified timeframes (see Conditions 11m) and 11o))	Table 8, Table 9 and Table 10 of the BTF Management Plan provides goals, performance criteria, mitigation measures, triggers and correction actions. The effects of subsidence and groundwater impacts on BTF habitat (i.e., habitat modification) are included in Table 8, Table 9 and Table 10. Goals and triggers are based on the baseline condition of BTF habitat as determined from several years of baseline monitoring surveys. These focus on a range of vegetation and floristics data collected since the EIS. See Table 8, Table 9, Table 10 and Appendix E and F (summary of baseline nesting and analysis). Section 6.5 of the BTF Management Plan describes the approach to achieving offsets and states that if additional impacts are proposed, or occur unexpectedly, then additional offsets will be provided, subject to approval from government agencies. This is stated to include circumstances where the corrective management measures have not achieved the goals within specified timeframes, and resulted in impacts beyond those that were originally approved. Table 8 also states a corrective action that may include the provision of offsets.	Section 6.4, Table 8, Table 9 and Table 10. Table 8, Table 9 and Table 10. Table 8, Table 9, Table 10 and Appendix E and F Section 6.5 and Table 8.	
	g) An ongoing monitoring program to determine the success of mitigation and management measures against the stated criteria in Condition 6f), including monitoring locations, parameters and timing. Monitoring for water resources Matters of National Environmental Significance must include hydrogeological, hydrological and ecological parameters	Details of the ongoing monitoring program are provided in Section 7 of the BTF Management Plan, and specifically Tables 8 to 10 address evaluating the success of mitigation measures. There are objectives to assess the success of mitigation and management measures.	Section 7 and Tables 8 to 10	
	h) Details of how compliance will be reported	Reporting and compliance procedures are described in Section 9 of the BTF Management Plan. Section 9.2 provides details of periodic reporting and audits to monitor compliance with management plan requirements.	Section 9	

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
	i) Details of how the MNESMP will be updated to incorporate and address outcomes from research undertaken for Matters of National Environmental Significance under this and any state approvals, including updating of goals, criteria and triggers (as required under Conditions 3c), 3d) 6e) and 6f))	Section 9.1 of the BTF Management Plan provides details of how the plan will be updated in response to outcomes of research, monitoring and management actions. An adaptive management approach will be taken and revisions to the survey and monitoring program will be carried out in consultation with the BTF recovery team, in accordance with Condition I7 of the EA. Section 6.1 of the BTF Research Program provides details of how the adaptive management process will be applied to BTF research.	Section 9.1	Section 6.1
	j) Provisions to ensure that suitably qualified and experienced persons are responsible for undertaking monitoring, review and implementation of the MNESMP	Section 9.3 of the BTF Management Plan outlines the qualifications of persons responsible for monitoring, reviewing and implementing the plan. This relates primarily to the qualifications of ecologists conducting field surveys and of spotter-catchers that may be involved in handling or managing the impacts of clearing on the species.	Section 9.3	
	k) In the event that future baseline research required by the Queensland Coordinator-General (Appendix 1, Section 3, Condition 1 of the Coordinator-General's Assessment Report) identifies that the Mellaluka Springs Complex provides high value habitat for the Black-throated finch, the approval holder must include management measures to address impacts resulting from drawdown at the Mellaluka Springs Complex in the MNESMP	Studies have determined that the Mellaluka Springs Complex does not provide BTF habitat. A letter from the Office of the Coordinator-General, dated 22 July 2016, has been received confirming the Commonwealth and Queensland government's acceptance of this finding.	Not applicable	
	l) Details of how, where habitat for an EPBC Act listed threatened species or community not previously identified and reported to the Department is found in the Project Area, the approval holder will notify the Department in writing within five business days of finding this habitat, and within 20 business days of finding this habitat will outline in writing how the conditions of this approval will still be met (refer Condition 11j)).	This condition is addressed in the approved threatened species management plan for the Carmichael Mine. Section 5.1 of that plan says "In the event that new species or Threatened Ecological Communities are found, then ~~DoE~~ DAWE and/or DES will be notified within five business days and Adani will outline how the conditions of this approval will still be met within 20 business days". The BTF Management Plan deals only with the BTF.	Not applicable	
EPBC Act Approval, condition 7	Mining operations must not commence until the required MNESMP have been approved by the Minister in writing. The approved plan must be implemented. Note – Management plans such as the Black-throated Finch Management Plan and the Groundwater Dependent Ecosystems Management Plan may also be required under state approvals. Wherever possible a combined document should be prepared to address both state government and EPBC Act approval conditions. Note – Impacts of the action other than mining operations will be offset as required in accordance with Conditions 8 to 11, but will be otherwise managed in accordance with state approvals – this is of particular relevance when impacts may occur prior to approval of the MNESMP.	Mining operations will not commence until this plan has been approved. This plan addresses the combined requirements of the Commonwealth and Queensland governments in one document, as encouraged by the condition.	Not applicable.	
Carmichael Coal Mine and Rail Infrastructure Project Coordinator-General's Report, Imposed Condition 1.	**Black-throated Finch (southern) baseline research for the Carmichael project** a) To increase the knowledge of the ecological requirements of BTF populations likely to be directly and indirectly impacted by the project, the proponent must undertake further baseline research prior to the commencement of Project Stage 2.	~~Adani~~ Bravus has undertaken extensive baseline research and monitoring since the EIS, and prior to the commencement of Project Stage 2. This work is ongoing and is summarised in Section 2.6 of the BTF Research Program.		Section 2.6
	(b) Prior to continuing the baseline research, a suitably qualified person must finalise a baseline research plan to the satisfaction of the authority responsible for administering threatened species provisions of the *Nature Conservation Act 1992* that includes a description of chosen methodologies.	A Research Program is established in Appendix C of the BTF Management Plan. This provides details of the chosen methodologies and research objectives. ~~Adani~~ Bravus has maintained ongoing consultation with DES on the progress of baseline monitoring surveys (Section 2.6 of BTF Research Program) and incorporated feedback into the development of the Research Program.		Entire document
	(c) The baseline research must include: (i) a minimum of two wet season surveys of the project area (ii) a minimum of two dry season surveys of the Mellaluka Springs Complex (iii) the collection of floristic data to enable the identification and mapping of key seasonal (wet and dry season) food sources.	B~~To date, b~~aseline research work conducted by ~~Adani~~ Bravus includes 13~~0~~ surveys across both wet and dry seasons between 2012 and 2018, as summarised in Section 2.6 of the BTF Research Program. Three subsequent surveys were completed between 2018 and 2020. Surveys of the Mellaluka Springs Complex have been completed to the satisfaction of DES and ~~DoE~~DAWE, as outlined in letter from the Office of the Coordinator-General, dated 22 July 2016. Monitoring has included floristic data to enable the identification and mapping of key seasonal food sources. This baseline research is ongoing, as outlined in Section 7 of the BTF Management Plan and Section 4 of the BTF Research Program.		Section 2.6, Section 4

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
	(d) The baseline research must determine: (i) whether the Mellaluka Springs Complex provides BTF habitat, particularly as a refuge during the dry season (ii) movement patterns, habitat requirements and population dynamics, including dietary requirements, home range, nesting requirements (iii) responses to grazing management, fire management and water body locations.	In July 2016, the Office of the Coordinator-General confirmed the baseline research work undertaken by ~~Adani~~ Bravus has satisfied the requirements of Imposed Condition 1: part (d)(i). ~~To date, baseline~~Baseline research work conducted by Adani includes 13 surveys across both wet and dry seasons between 2010 and 2018, as summarised in Section 2.6 of the BTF Research Program. Three subsequent surveys were completed between 2018 and 2020. Findings of this work in relation to nesting, feeding habitat and dietary requirements are summarised in Appendix E and F. This work is ongoing, as outlined in the BTF Research Program. Responses of the BTF to grazing management, fire management and water body locations are key research objectives as outlined in Section 4 of the BTF Research Program.	Appendix E and F	Section 4
Carmichael Coal Mine and Rail Infrastructure Project Coordinator-General's Report, Imposed Condition 4 and Condition 5 (apportionment of costs).	**Proponent contribution to BTF Bioregional Management Plan** a) To address project impacts and maximise the ongoing protection and long-term conservation of the Black-throated finch (BTF) southern subspecies (*Poephila cincta cincta*), and its habitat in the Galilee Basin and Desert Uplands bioregion, the proponent must, when required by the administering authority responsible for the threatened species provisions of the *Nature Conservation Act 1992*: (i) Prepare, to the satisfaction of the administering authority, an ongoing BTF monitoring program that takes into account the relevant requirements of any BTF Bioregional Management Plan specified in Appendix 1, Section 2, Part B and the outputs of baseline research required in Appendix 1, Section 3, Condition 1	The BTF Management Plan includes an ongoing monitoring program (Section 7) and Research Program (Appendix C) for BTF. Whilst there is not yet any bioregional management plan established by government to address regional impacts to the BTF arising from multiple mines proposed for the Galilee Basin, ~~Adani~~ Bravus is committed to participating in the BTF Bioregional Management Plan once established, through the provision of data from this BTFMP.	Section 7 Appendix C	Entire document
	(ii) Provide baseline and survey results in the format and at intervals specified for the coordination of bioregional survey data to the administering authority for any BTF Bioregional Management Plan			
	(iii) Contribute to the operation of any BTF Bioregional Management Plan including pro-rata funding.			
	Detailed condition about apportionment of costs for bioregional management plan.			
Environmental Authority, condition I6	**Black-throated finch (BTF) Species Management Plan (SMP) at Carmichael project** The holder of this environmental authority must submit a BTF SMP prepared and certified by a suitably qualified person to the administering authority prior to commencement of Project Stage 2 for approval. The holder must publish the BTF SMP on its website within 10 business days of receiving the administering authority's approval in writing. The approved BTF SMP must be implemented.	The BTF Management Plan has been prepared and certified by Eco Logical Australia, a national environmental consulting company with ~200 staff. Correspondence has been provided to DES outlining the qualifications and experience of the management plan authors (demonstrating that they are suitably qualified), and providing certification. Project Stage 2 will not commence until the BTF Management Plan is approved by the administering authority. The BTF Management Plan will be published online within 10 days of approval by the administering authority and will be implemented.	Entire document	Entire document
	The holder must align the SMP with any Bioregional BTF Management Plan and relevant documentation requirements under the *Environmental Protection and Biodiversity Conservation Act 1999* including BTF Recovery Plan, conservation advice and the threat abatement plan.	This plan is consistent with the BTF Recovery Plan. Threats identified in the BTF Recovery Plan are addressed specifically in Section 4.6 and Table 4. These threats include clearing and fragmentation of vegetation, degradation of habitat by stock and pest species, alteration of habitat by fire regime, invasion by exotic weeds including grasses and predation by introduced predators. Potential project impacts are discussed in Section 4.6. Monitoring and research activities of the BTF Management Plan closely align with recovery objectives described in Section 5 of the BTF Recovery Plan (e.g. investigate breeding requirements, quantify distribution and abundance, investigate feeding and other habitat requirements). Further details of these measures are provided in Section 7 of the BTF Management Plan. There are no current threat abatement plan or conservation advices in force for the BTF. There is currently no Bioregional BTF Management Plan.	Section 4.6 and Table 4	
	The submitted BTF SMP plan must include: a) A baseline research program on the specific nesting and feeding requirements of the species that will be undertaken prior to and during project stage 1.	~~Adani~~ Bravus has undertaken extensive and ongoing baseline monitoring of BTF, including the specific nesting and feeding requirements of the species. This work has been undertaken prior to and during project stage 1, since the wet season of 2012. Details of the monitoring program are provided in Section 2.6 of the BTF Research Program. Appendix E also summarises the findings of this monitoring.	Appendix E	Section 2.6

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
	The submitted BTF SMP plan must include: … b) A baseline research program to establish whether the BTF at the project site are sedentary, locally migratory or regionally migratory.	~~Adani~~ Bravus has undertaken extensive and ongoing baseline monitoring of BTF. Determining the home range and movement patterns of BTF in the project area is a major objective of the BTF Research Program (see Section 4.3)		Section 2.6, Section 3 and Section 4 of the Research Program
	The submitted BTF SMP plan must include: … c) A description of how the results of baseline research are to be used to determine any changes of classification of and/or impact on BTF habitat.	Section 5 of the BTF Management Plan describes the adaptive management framework that will be applied to deal with uncertainty and incomplete knowledge using systematic monitoring to reduce uncertainty and improve management actions over time. Section 6 provides details of how the learnings from this research will be applied to minimise project impacts on BTF, and Section 9.1 provides details of how this will be reported to the Department. Further details on the adaptive management approach to applying research findings are also provided in Section 6.1 of the BTF Research Program.	Sections 5, 6 and 9.1	Section 6.1
	The submitted BTF SMP plan must include: … d) Details of proposed impacts to BTF habitat from each project stage including impacts from clearing, subsidence, ecological function changes, hydrological changes and weed and pest infestation changes.	Details of potential project impacts are provided in Section 4.6 of the BTF Management Plan, including Table 4. Direct impacts from vegetation clearing and subsidence are provided for each stage of the project, consistent with the project Biodiversity Offset Strategy. The scale of indirect impacts are discussed, where this is possible to describe in a qualitative manner.	Section 4.6	
	The submitted BTF SMP plan must include: … e) Mitigation measures to be undertaken to avoid, mitigate and manage impact resulting from each stage of the project, including rehabilitation of habitat.	Detailed mitigation measures are provided in Section 6 of the BTF Management Plan. These cover issues such as clearing and fragmentation of habitat, injury to BTF during works, habitat degradation, loss of water resources and contamination of water sources. Rehabilitation of disturbed areas is addressed in Table 7 and Table 8.	Section 6 and Table 7 and Table 8	
	The submitted BTF SMP plan must include: …. f) Monitoring of watering points that must be conducted for a minimum six (6) hour period commencing from dawn, to accurately capture BTF utilisation of water points.	Section 7.1.2.1 describes the approach to water source watches, which involve six continuous hours of survey commencing from dawn at 16 water sources where BTF have previously been recorded. This requirement was changed in March 2021 to be 3 hours from 9 am, for consistency with EA and OAMP. Initial monitoring has revealed that the majority of BTF are observed during this period, and that six hour monitoring is not required.	Section 7.1.2.1	
	The submitted BTF SMP plan must include: … g) Detailed botanical assessment that must occur at all BTF sighting locations in the Project Area to record habitat values at those locations.	Vegetation assessments are described in Sections 7.1.2.6 and 7.1.2.7 of the BTF Management Plan. They include vegetation transects, foraging plots and groundcover monitoring. Detailed research activities on BTF habitat are also outlined in Section 4.4 of the Research Program.	Section 7.1.2.6 and Section 7.1.2.7.	Section 4.4
	The submitted BTF SMP plan must include: … h) Detailed survey that must occur across the mining lease area and approved offset areas and must include information on BTF movements. The survey method and effort must be sufficient to accurately describe the BTF home range and detail BTF resource usage patterns between seasons and years (for up to 10 years) and allow robust management actions to be developed for the maintenance of a viable local BTF population.	Estimating the home range and movements of BTF is a key aim of the Research Program. Objectives, methods, variables to be monitored, resources and timing are outlined in Section 4.3 of the Research Program. Section 7.2 of the BTF Management also discusses this program of surveys.	Section 7.2	Section 4.3
	The submitted BTF SMP plan must include: … i) Survey work that should incorporate the usage of call playback and identify all birds present when BTF are encountered.	Call playback has been utilised in previous surveys as described in Section 4.5 of the BTF Management Plan and Section 2.6 of the Research Program. An EA amendment will be sought to remove this method, which has been found to have limited benefit. Section 7.1.2 of the BTF Management Plan describes monitoring methods and specifies that all birds are to be identified when BTF are encountered. This is also specified in Section 4.4.4 of the Research Program.	Section 4.5 and Section 7.1.2.	Section 2.6 and Section 4.4.4

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
	The submitted BTF SMP plan must include: … j) Specific surveys that must be undertaken during the BTF breeding season and include nest location and assessment of the habitat attributes associated with the breeding locations. The survey method and effort must be sufficient to accurately describe the BTF breeding requirements with consideration to spatial and temporal variation of resources of up to 10 years.	Determining the breeding habitat requirements of the BTF and the relationship with vegetation structure and composition and water is part of a key aim of the Research Program. Details of the objectives, variables to be monitored, methods, resources and timing are outlined in Section 4.4 of the Research Program. Section 7.2 of the BTF Management also discusses this program of surveys. Baseline monitoring activities described in Section 2.6 of the Research Program have also collecting information on nests, if present.	Section 7.2	Section 4.4
	The submitted BTF SMP plan must include: … k) Survey and monitoring that must be undertaken by experienced ecologists.	The qualifications and experience required by ecologists implementing the BTF Management Plan are outlined in Section 9.3. The involvement of suitably qualified and experienced professionals in the implementation of the Research Program is also discussed in Section 4.1 of the Research Program.	Section 9.3	Section 4.1
Environmental Authority, condition I7	The BTF SMP under condition I6 must be reviewed by an appropriately qualified person annually and a report prepared on 1 July each year. The report must: a) Assess the plan against the requirements under condition I6.	As outlined in Section 4.1 of the Research Program, The BTF Management Plan and Research Program will be reviewed annually by an appropriately qualified person, and revisions of the survey and monitoring program will be carried out in consultation with the BTF Recovery Team. Any revisions must be independently peer reviewed. An annual report of research findings and the results of the independent peer review will be provided to DES.		Section 4.1
	… b) Include recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year.			
	…c) Identify any amendments made to the BTF SMP following the review.			
	… d) All revisions of the survey and monitoring program must be carried out in consultation with the BTF recovery team.			
	e) Any revisions must be independently peer reviewed.			
Environmental Authority, condition I8	The baseline research program must fund a research project to determine the relationship between water sources, woody habitat and the BTF food sources within the mining lease area and approved offset areas to determine the inter-relationships among these factors.	The Research Program will determine the relationship between water sources, woody habitat and the FBT food sources within the mining lease area and approved offset areas, and the inter-relationships among these factors. This is explained in Section 4.2 of the Research Program, with further details provided in Sections 4.4 and 4.5 of the Research Program.		Sections 4.2, 4.4. and 4.5
Environmental Authority, condition I9	The baseline research program under Condition I6 must: a) Establish whether Ten Mile Bore and surrounds are high value habitat for the species, and	Surveys completed by ~~Adani~~ Bravus to date have identified that BTF are particularly abundant in the area around Ten Mile bore (Section 4.5 of BTF Management Plan). Section 4.4 of the Research Program outlines the objective of determining whether Ten Mile Bore and surrounds are high value habitat for BTF. The research will also determine the characteristics of Ten Mile Bore and surrounds that contribute to its frequency of use and compare this with other waterholes and woodlands, through equivalent frequency monitoring.	Section 4.5	Section 4.4
	b) Establish management actions to maintain the current BTF population of Ten Miles Bore and surrounds	Management of the Ten Mile Bore area is discussed in Section 6.4.7. Monitoring and management actions for the Ten Mile Bore area will be reviewed and modified in line with BTF Research Program outcomes, as described in Section 4.6.1 of the Research Program. Interim management of the Ten Mile Bore area is discussed in Section 6.4.7. Monitoring and management actions for the Ten Mile Bore area will be reviewed and modified in line with BTF Research Program outcomes, as described in Section 4.6.1 of the Research Program.	Section 6.4.7	Section 4.6.1
Environmental Authority, condition I10	The holder of this environmental authority must maintain water troughs for BTF within undisturbed areas and surface areas of underground mining footprint, and repair where necessary troughs, pipes and tanks to a standard that maintains a constant source of water.	Troughs are identified as an important water source for BTF in the study area (e.g. Section 4.6.3 of BTF Research Program). Table 10 (Section 6.1) of the BTF Management Plan states that known water sources will be avoided, or alternative water sources established outside of disturbance footprint, if avoidance is not possible. Section 6.4.4 of the BTF Management Plan also states that current water sources outside of the clearing footprint are to be maintained. Where it is necessary to remove a particular water source within or nearby to BTF habitat, a new water source will be created.	Section 6.3.3, Section 6.4.4 and Table 10	Section 4.6.3

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
~~Adani~~ Bravus Commitment, M4.29	Management actions will seek to maintain and where possible enhance Black-throated finch habitats and populations (e.g. pest control, water source, grazing and fire management) in unmined parts of the Mine Area, as well as in offset areas.	Section 6.1 of the BTF Management Plan commits to monitoring BTF habitat values through annual groundcover assessments ~~during~~ no later than the end of May to maintain and enhance BTF habitat within the Mining Lease. Table 8 also states as a mitigation measure – Manage non-mined and offset areas to maintain and improve BTF habitat values. This work will be guided by results from annual vegetation assessments, annual BTF surveys and the BTF Research Program.	Section 6.1, Table 8	
~~Adani~~ Bravus Commitment, M4.30	Black-throated finch surveys will continue so as to provide data on temporal and spatial variation of habitat use in the Mine Area and will contribute significant local data for incorporation into the Black-throated Finch Species Management Plan for the Mine Area, which will assist in refinement of species recovery actions and mitigation of impacts on the Mine Area.	BTF surveys have continued as outlined in this commitment. This work is summarised in Section 2.6 of the Research Program. This work will continue as described in Section 7 of the BTF Management Plan and the Research Program.	Section 7	Section 2.6, entire document
Bravus~~Adani~~ Commitment, P6.30	Monitoring events will commence at least one year before mining operations (in order to continue a baseline understanding of existing conditions), and continue for at least two years after mining operations are completed.	Monitoring of BTF has been ongoing since the project EIS, as outlined in Section 2.6 of the BTF Research Program. A long-term program of research and monitoring has been established.	Section 7.1	Section 2.6
Bravus~~Adani~~ Commitment, P6.51	The loss of habitat for the Black-throated finch (southern) will occur in stages, in accordance with the staged development of the operational components of the Mine Area. Management actions to encourage dispersal away from areas that will be cleared for staged Mine operations will also be developed.	Section 6.3.1 of the BTF Management Plan describes the staged approach to clearing of vegetation in accordance with this commitment.	Section 6.3.1	
Bravus~~Adani~~ Commitment, P6.52	Management actions for Black-throated finch will seek to maintain and where possible enhance habitats and populations (e.g. through pest control, provision of water sources, appropriate grazing and fire management) in unmined parts of the Mine Area, as well as in offset areas.	Section 6.1 of the BTF Management Plan commits to monitoring BTF habitat values through annual groundcover assessments ~~during~~ no later than the end of May to maintain and enhance BTF habitat within the Mining Lease. Table 8 also states as a mitigation measure – Manage non-mined and offset areas to maintain and improve BTF habitat values. This work will be guided by results from annual vegetation assessments, annual BTF surveys and the BTF Research Program.	Section 6.1, Table 8	
Bravus~~Adani~~ Commitment, P6.53	Important population, movement and habitat information for Black-throated finch will be collected, particularly with respect to seasonal use, key areas, nest sites, important feeding areas and management of threatening processes.	Section 7 of the BTF Management Plan and Section 4 of the Research Program outline research and monitoring tasks that are consistent with this commitment.	Section 7	Section 4
Bravus~~Adani~~ Commitment, P6.54	Bravus~~Adani~~ will provide a Draft Black-throated Finch Management Plan for approval prior to the commencement of mine construction. The Plan will include the following: 1. A management framework that aligns with the other project management plans 2. Clear statements regarding the intent, approval requirements, objectives and actions 3. Details of how the management plan will be applied across the project phases – pre construction / construction / operation / post operations, 4. Offset areas 5. Details of the current and proposed adaptive monitoring program to support the plan objectives. 6. Details of how experts will be used in a review capacity to inform ongoing monitoring and management 7. Incorporates all proposed management and mitigation measures, including reference to how these will align with the Significant Impact Guidelines and the National Recovery Plan. 8. Specific performance targets and how these will be measured and reported.	This BTF Management Plan and Research Program address these requirements.	Details are addressed in the following sections: 1) Section 1.3 2) Section 1 3) Section 6 4) Section 6.5 5) Section 5 6) Section 9 7) Section 6 8) Section 6 and Section 9	5) Section 6.1 6) Sections 4.1 and 6
Bravus~~Adani~~ Commitment, P6.55	Black-throated finch surveys will continue over time to provide data on temporal and spatial variation of habitat use in the Mine Area and will contribute significant local data for incorporation into the Black-throated Finch Species Management Plan for the Mine Area, which will assist in refinement of species recovery actions and mitigation of impacts on the Mine Area. In the case of subsidence, which will occur gradually and in a complex and partly unpredictable manner, the data being collected by this monitoring will provide information regarding the best strategies over time to mitigate negative effects and manage key resources for Black-throated finch on the Mine Area.	BTF surveys have continued in accordance with this commitment. A program for future monitoring and research is outlined in this plan.	Section 7	Entire document

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Approval & condition number	Description of Condition or Commitment	How Addressed	Section of BTF Management Plan	Section of BTF Research Program
Bravus~~Adani~~ Commitment, P6.56	The onsite and offsite (offset areas) habitat management and complementary monitoring program, as described above, will be developed and implemented in consultation with relevant stakeholders (i.e. Black-throated Finch Recovery Team, Commonwealth and State governments).	This plan has been developed in consultation with relevant stakeholders. Implementation of the plan will be conducted as described in Section 9.2 of this plan and Section 6.2 of the Research Program. This involves sharing the findings of the research with the BTF Recovery Team for use and updating of the recovery plan and ongoing engagement with Commonwealth and state governments.	Section 9.2	Section 6.2
Bravus~~Adani~~ Commitment, P6.57	~~Adani's~~ The overarching commitments of Bravus in regards to the Black-throated Finch are: 1. Implementing management measures across the Project Mining Lease where there are indirect impacts including land management activities, water management, habitat maintenance, pest control, fire management, survey and recording. This commitment would continue through the duration of mining operations. 2. Implementing management measures across a proposed like for like mitigation area within those property areas mapped in Figure 1 below, including land management activities, water management, habitat maintenance, pest control, fire management, survey and recording. This commitment would continue for a period of 20 years. 3. Securing and maintaining appropriate offsets including land management activities, water management, habitat maintenance, pest control, fire management, survey and recording. This commitment would continue for the duration of the offset agreement, nominated as 20 years. 4. Ongoing monitoring programs locally, and contributing to regional monitoring programs including utilising and assisting where possible monitoring effort from the BTFRT. This commitment would continue for a period of 10 years, commencing from 2014. 5. Contributing time and resources to a government-led regional management program. In the order of an in-kind contribution of $100,000 per year, over a period of 10 years, commencing from Mining Operations.	~~Adani~~ Bravus has met these commitments to the BTF, as summarised in the BTF Management Plan and associated Research Program. Indirect impacts are addressed in Section 6 of the BTF Management Plan, and include a range of land and water management activities and offsets. A long term program of research and monitoring has been established.	1-3) Section 6 4) Section 7 5) Government-led regional management program not yet established.	4) Entire document
~~Adani~~ Bravus Commitment, P6.60	Project Species Specific Management Plan(s) Key actions • Develop and implement programs to provide a greater level of detail on the ecology of threatened species at the Study Area – to be undertaken in collaboration with applicable research organisations, conservation groups and government agencies. Timeframes • Implement targeted ecology and threatened species programs prior to and during Mine operations. • Five yearly revisions and updating of this plan based on currency of information available.	The BTF Research Program outlines a comprehensive program to provide greater level of detail on the ecology of the BTF in the study area, in collaboration with relevant stakeholders.	Section 7	Entire document

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Appendix E Summary of baseline research on BTF nesting and foraging habitat in the project area (E2M Consulting)

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Appendix F Summary of baseline groundcover characteristics to assist with future management of grazing

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