

21 July 2020

REF: JW191273

Post Approvals Section
Department of Agriculture, Water and the Environment
GPO Box 858
CANBERRA ACT 2601

Via email only: postapprovals@environment.gov.au

Dear Sir/ Madam,

RE: EPBC 2017/8067 - Sanctum West Master Planned Community – Notification of Amendment to Black-throated Finch Management Plan

We act on behalf of Maidment Land Pty Ltd in relation to the abovementioned decision notice (Approval). The purpose of this letter is to notify the Department of changes to the Black-throated Finch Management Plan (the Plan) prescribed by Condition 1 of the Approval.

In accordance with Condition 9 of the Approval, the approved plan has been revised and a copy of the revised plan is enclosed herein. The revised plan will now be implemented as at the date of this notice.

Amendments to the plan were made in Section 6, paragraph 2 and in the monitoring program (Table 7) and implementation schedule (Table 8). These changes are considered largely administrative and relate to a delay in the timing and implementation of the ongoing monitoring plan to reflect unforeseen delays in the commencement of the action. In accordance with Condition 9, it is not considered likely that the abovementioned changes will result in a new or increased impact.

Implementation of the Plan has commenced consisting of baseline seasonal monitoring events in 2019 in accordance with Condition 1. Consideration has been given to the currency of the baseline data and a commitment made to ensuring baseline data has a maximum currency of two years.

If you have any questions regarding this letter, please contact myself via email Nicholas.baker@wildenvironmental.com, or phone (07) 4410 9000.

Yours sincerely



Nicholas Baker
DIRECTOR



environmental
consultants

Mitigation Driven Passive Relocation Plan Black-throated Finch



Sanctum West – Master Planned
Residential Community

Prepared for Maidment Land Pty Ltd

April 2020

www.wildenvironmental.com

Document Control

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Project Manager Nicholas Baker B.Sc CEnvP

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Document history and status

Revision	Date	Description	By	Review
0.1	25 August 2017	1 st Draft – Internal	LM	NB
0.2	28 August 2017	2 nd Draft - Internal	LM	NB
1.0	28 August 2017	3 rd Draft - External	NB	BTF Recovery Team
2.0	2 April 2020	Amendment – Section 6 & 7	EB	Del Windridge

Approval for Issue

Name and position	Signature	Date
Nicholas Baker, Director		3/04/2020

Permits and approvals

Wild Environmental Consultants operate in accordance with the following permits and approvals:

Scientific Use Registration Certificate (*Animal Care and Protection Act 2001*) – Registration Number 600

Scientific Purposes Permit (*Nature Conservation (Administration) Regulation 2006*) – Permit number WISP17791316

Animal Ethics Approval (Animal Ethics Committee) – AEC Application Reference Number CA 2016/08/997

Marine Parks Permit (*Great Barrier Reef Marine Park Regulations 1983* and *Marine Park Regulation 2006*) – G16/38539.1

Wildlife Authority (Rehabilitation Permit) (*Nature Conservation (Administration) Regulation 2017*) – WA0002733

Wildlife Authority (Damage Mitigation Permit) (*Nature Conservation (Administration) Regulation 2017*) – WA0005146



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Glossary and Abbreviation of Terms

BTF	Black-throated Finch (southern) (<i>Poephila cincta cincta</i>)
CC	Completion Criteria
DoE	Commonwealth Department of the Environment (formerly Department of Sustainability, Environment, Water, Population and Communities and Department of Environment and Energy)
DoEE	Former Commonwealth Department of Environment and Energy
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
MDPRP	Mitigation Driven Passive Relocation Plan
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	<i>Nature Conservation Act 1992</i>
PC	Performance Criteria
QLD	Queensland
RE	Regional Ecosystem
The Project	Sanctum West Master Planned Community
The Proponent	Maidment Land Pty Ltd
VM Act	<i>Vegetation Management Act 1999</i>
WPMP	Weed and Pest Management Plan



1. Introduction

1.1 Background

Maidment Land Pty Ltd (the Proponent) plans to develop Sanctum West, a master planned residential community situated on Lot 267 on EP1719 and Lot 257 on SP253223 (the proposed action). The proposed action is located approximately 19km west of the city of Townsville, bordered to the west by the Black River and to the east by the existing Sanctum Residential Estate. The proposed action includes a development footprint of approximately 390 Hectares (Ha) in area including traditional residential subdivision, open space, and associated infrastructure. The proposed development site is shown in Figure 1. This mitigation driven passive relocation plan (MDPRP) for the Black-throated Finch (BTF) has been prepared for Maidment Land Pty Ltd to inform a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The site of the proposed action has been the subject of extensive ecological and environmental investigations and flood modelling, which originally informed the Council and State Government approvals for the subdivision. The information presented in this MDPRP has been prepared based on the findings of these various studies and investigations.

1.2 Project details

The Proponent is planning to develop a large-scale residential housing estate located approximately 19 km west of the city of Townsville. The overall form of the development includes two main areas: Residential Planning Area, and Open Space Planning Area. The development will be staged over several years, commencing in the south-eastern corner of the site and progressively moving to the north and west (Figure 2).

While the predominant housing form will consist of single detached dwellings, the Residential Planning Area will offer an important element of choice with a mix of small to large lot sizes and some medium density development in close proximity to infrastructure and services¹. Other future uses may include schools or childcare centres to support the amenity of the Residential Planning Area. The Open Space Planning Area will comprise a network of formal parks, recreation areas and open space corridors, accommodating and enhancing the site's natural drainage systems.

The Open Space Planning Area will be made up of two key land types as follows:

¹ Townsville City Council (2016), Council Approves Sanctum Extension – a media release published 14 December 2016, accessed at <https://www.townsville.qld.gov.au/about-council/news-and-publications/media-releases/2016/december/council-approves-sanctum-extension>, 21 August 2017



- conservation areas of sustained natural habitat; and
- modified natural spaces in the urban environment.

The modified area design is influenced by the storm water drainage corridor which effectively divides the development in two.

Retained natural vegetation and creek/river buffers surround the development and have been included in response to the site environmental values.

Within the Project area, approximately 77% of vegetation has been historically cleared for grazing purposes and is now considered non-remnant vegetation. Approximately 88ha of native remnant vegetation will be cleared as a result of the proposed action, all of which is classified as least concern under the *Vegetation Management Act 1999* (VM Act).

The development layout shown in the approved development plan (Figure 2) has been carefully designed and selected to avoid and/or minimise impacts on habitat for species of conservation significance, habitat connectivity and flood immunity. Some of the avoidance measures adopted to address these issues include the following:

- maintaining a significant riparian buffer (minimum 100 m) along Low Creek and the Black River;
- maintaining important areas of remnant vegetation in the northern part of the site; and
- maintaining hydrological connectivity and open space between the eastern and western sides of the development as a drainage corridor.

Mitigation Driven Passive Relocation Plan

Sanctum West



Figure 1. Site Location.



MAP 3 RESIDENTIAL STAGING PLAN



SANCTUM WEST
FOR DISCUSSION PURPOSES

This plan is conceptual and for discussion purposes only. All areas, dimensions and lot uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.



Date: 18th June 2014
Scale: 1:15,000 @ A3
Drawn: SEM
Job No: 29590/1-1
Plan No: 29590.012 E

surveying | town planning | project management | mapping and GIS

Figure 2. Approved Development Plan and Staging Plan for the Sanctum West Master-planned Community.



1.3 Site description

1.3.1 Regional context

The proposed action lies within the coastal floodplains of the Townsville Plains subregion of the Brigalow Belt Bioregion. The project site is within the Black River Drainage Sub Basin and contains floodplain wetlands and saltmarsh estuarine marine habitat in the northern section, which will be avoided by the development². The project site contains a mosaic of remnant and non-remnant vegetation communities situated on flat alluvial plains characterised by strongly duplex soils of sandy loam and heavy clay^{3,4,5}. The project site is situated within Queensland's northeast, specifically within the tropical savannah region. The area experiences monsoonal summers and dry, mild winters. The average rainfall is 1143 mm, with the majority of rain falling in the wet season, between November and April⁶.

1.3.2 Land use

1.3.2.1 Historical land use

The site has been subject to extensive and widespread clearing of native vegetation for the purpose of livestock (cattle) grazing⁷. A large proportion of the site still supports pasture grasses, including introduced grass species, which dominate the standing biomass in many areas⁸.

The South American plant, Stylo (*Stylosanthes scabra*) has been introduced to the site to improve pasture for cattle grazing. This shrubby perennial (to about 1.2 m high) is widespread on the site, though particularly abundant (and dominant) across parts of the site (both cleared areas and patches of remnant regrowth vegetation)^{9,10}. A dense ground cover of Stylo is note-worthy as it can negatively impact on Black-throated Finch habitat values by reducing the birds' accessibility to ground stored seed, by reducing the abundance

² Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

³ Department of Natural Resources and Mines (2017a), Vegetation Management Report For Lot: 267 Plan EP1719, a report compiled by Operations Support, Department of Natural Resources and Mines, 21 August 2017

⁴ Department of Natural Resources and Mines (2017b), Vegetation Management Report For Lot: 257 Plan SP253223, a report compiled by Operations Support, Department of Natural Resources and Mines, 21 August 2017

⁵ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

⁶ Australian Bureau of Meteorology (2017), Climate of Townsville. Accessed online at: http://www.bom.gov.au/qld/townsville/climate_Townsville.shtml, 14 June 2017

⁷ Austecology (2014), Black-throated finch *Poephila cincta cincta* Assessments, Lots 267 EP1719 and 256 SP196179, Townsville, an unpublished report prepared for Glen Maidment, Platinum Developments, March 2014

⁸ Austecology (2014), Black-throated finch *Poephila cincta cincta* Assessments, Lots 267 EP1719 and 256 SP196179, Townsville, an unpublished report prepared for Glen Maidment, Platinum Developments, March 2014

⁹ Austecology (2014), Black-throated finch *Poephila cincta cincta* Assessments, Lots 267 EP1719 and 256 SP196179, Townsville, an unpublished report prepared for Glen Maidment, Platinum Developments, March 2014

¹⁰ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty



of seeding grasses suitable for BTF and by reducing the diversity of suitable seeding grasses and subsequently the seasonal continuity of food availability for BTF^{11,12}.

Other significant historical modifications to the site's landscape include the development of a number of farm dams (eight in total), one of which was used to hold treated effluent pumped from the Council's sewer treatment plant between 2002 and 2009. A series of ponded pastures were also established within the southern part of the site in 1999. Agnew, L. of Austecology (2014) derived the following information from personal communications with the landowner, Ms Dianna Brabon, who has lived on the site since the mid-1970s:

- the ponded pastures were established approximately 15 years ago and decommissioned in early October 2012 (bund walls were breached and removed and pastures drained);
- the ponds were constructed to provide fodder for beef production. Hymenachne *Hymenachne amplexicaulis* and Para grass *Urochloa mutica* were introduced specifically for the purpose of improved pastures;
- following a "typical" wet season, by late October to early November (late dry season) ponded pastures were usually dry.

1.3.2.2 Current land use

Recent and current land use includes light to medium cattle grazing, the production of pasture crops (in the north-eastern part of the site) and a single house dwelling located towards the northern extent of the site.

In addition, the Project area has been the subject of extensive and long-term environmental and ecological studies in recent years to support the future development of the site.

1.3.3 Existing environmental values

1.3.3.1 Vegetation communities

The project site is characterised by mostly non-remnant vegetation¹³. Two (2) areas of remnant vegetation are located in the northern and south-eastern sections of the proposed action. All remnant vegetation communities are classified as least concern regional ecosystems under the VM Act. The regional ecosystems

¹¹ Austecology (2014), Black-throated finch *Poephila cincta cincta* Assessments, Lots 267 EP1719 and 256 SP196179, Townsville, an unpublished report prepared for Glen Maidment, Platinum Developments, March 2014

¹² Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black-throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

¹³ LAMR Pty Ltd and DA Environmental (2012), Environmental (Flora) Assessment, Lot 267 EP1719 and Part Lot 256 SP196179, an unpublished report prepared for Glen Maidment, Platinum Developments, September 2012



on the project site were surveyed to ground truth the remotely sensed data^{14,15}. Both the northern and south-eastern remnant vegetation areas were generally found to be consistent with the mapped regional ecosystems, although not entirely representative of the whole vegetation mosaic on the project site.

Generally, the terrestrial habitats within the project site include a range Melaleuca dominated wetlands, Eucalyptus and Corymbia open woodlands and existing cleared non-remnant areas. Habitats within the project site are affected by infestations of invasive flora which are common throughout the Project site. Such species include Chinese apple (*Ziziphus mauritiana*), Rubber vine (*Cryptostegia grandiflora*), Stylo (*Stylosanthes scabra*), Snakeweed (*Stachytarpheta jamaicensis*), Hymenachne (*Hymenanche amplexicaulis*) and Para grass (*Urochloa mutica*)¹⁶.

Previous ecology surveys have directly assessed the composition and arrangement of ground cover species within the project site^{17,18,19}. The composition and density of ground cover is a major determinant of suitable habitat to a lot of Australian woodland and savannah species. Notably, suitable habitat for the BTF is highly dependent on suitable grass species and the density of ground cover²⁰.

A total of 38 grass species were identified on the project site. However, these grass species are generally outcompeted by the introduced *Stylosanthes scabra* and *Stachytarpheta jamaicensis*. Ground cover species composition and density also showed distinct seasonal variability, with a total of 18 grass species identified during the dry season, while *Stylosanthes scabra* continued to dominate the ground layer²¹.

1.3.3.2 Water values

The property is situated adjacent to the Black River and contains four (4) watercourse or drainage features (stream orders 1 and 2), according to the Vegetation Management Watercourse and Drainage Feature Map

¹⁴ LAMR Pty Ltd and DA Environmental (2012), Environmental (Flora) Assessment, Lot 267 EP1719 and Part Lot 256 SP196179, an unpublished report prepared for Glen Maidment, Platinum Developments, September 2012

¹⁵ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

¹⁶ LAMR Pty Ltd and DA Environmental (2012), Environmental (Flora) Assessment, Lot 267 EP1719 and Part Lot 256 SP196179, an unpublished report prepared for Glen Maidment, Platinum Developments, September 2012

¹⁷ LAMR Pty Ltd and DA Environmental (2012), Environmental (Flora) Assessment, Lot 267 EP1719 and Part Lot 256 SP196179, an unpublished report prepared for Glen Maidment, Platinum Developments, September 2012

¹⁸ Austecology (2014), Black-throated finch *Poephila cincta cincta* Assessments, Lots 267 EP1719 and 256 SP196179, Townsville, an unpublished report prepared for Glen Maidment, Platinum Developments, March 2014

¹⁹ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

²⁰ Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black-throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

²¹ LAMR Pty Ltd and DA Environmental (2012), Environmental (Flora) Assessment, Lot 267 EP1719 and Part Lot 256 SP196179, an unpublished report prepared for Glen Maidment, Platinum Developments, September 2012



under s20AB of the VM Act. Natural wetlands also exist across approximately 2.5 Ha in the southern section of the site.

1.3.3.3 Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) which are considered likely to be impacted by the project include:

- Black-throated Finch
 - The Black-throated Finch (southern) is listed as endangered under the *Nature Conservation Act 1992* (NC Act). It is also listed as endangered under the Australian Government EPBC Act, and therefore is a MNES. Terrestrial ecological surveys of the Project site between 2012 and 2014 confirmed the presence of a population of Black-throated Finch that have the potential to be impacted by the Project if they still persist in the area.
- Bare-rumped Sheathtail Bat
 - Although the Bare-rumped Sheathtail Bat has recently (November 2016) had its EPBC threatened status listing changed from Critically Endangered to Vulnerable, it remains a MNES. It is also listed as endangered under the NC Act.
- The Great Barrier Reef Marine Park.
 - The site of the proposed action is located approximately 2.5 km inland from the coastline and therefore the Great Barrier Reef Marine Park, World Heritage Area (Great Barrier Reef) and a National Heritage Area (Great Barrier Reef). The project site is situated within the Black drainage basin (1060 km²) and the proposed action has the potential to impact on the Great Barrier Reef via terrestrial runoff from the project site as it is hydrologically connected via Low Creek and Black River. Urban runoff is considered a relatively minor contribution to the impacts from excess nutrients, fine sediments, and pesticides on the Great Barrier Reef²². Further, it also needs to be considered that the existing land use (agriculture) is likely a higher contributor to diffuse source pollution than the intended land use.

²² Eberhard, R., Thorburn, P., Rolfe, J., Taylor, B., Ronan, M., Weber, T., Flint, N., Kroon, F., Brodie, J., Waterhouse, J., Silburn, M., Bartley, R., Davis, A., Wilkinson, S., Lewis, S., Star, M., Poggio, M., Windle, J., Marshall, N., Hill, R., Maclean, K., Lyons, P., Robinson, C., Adame, F., Selles, A., Griffiths, M., Gunn, J., McCosker, K., 2017. Scientific Consensus Statement 2017: A synthesis of the science of land-based water quality impacts on the Great Barrier Reef, Chapter 4: Management options and their effectiveness. State of Queensland, 2017.



1.4 Purpose of the plan

This MDPRP provides a framework to support the passive relocation of BTF within the Project site and provides for the progressive management of potential impacts of the development on the BTF and their uncertain association with the habitat affected by the proposed action. It has been prepared to support an environmental impact assessment process for the Sanctum West Project under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.5 Aims and objectives of the plan

The aim of the MDPRP is to provide for the ongoing management and enhancement of the remaining remnant habitat within the Project site to facilitate the passive relocation of the BTF population from degraded non-remnant areas prior to construction impacts occurring.

Furthermore, the staged development of the Project, beginning in the south-east, will provide slow, even pressure as a mechanism to assist in shifting BTF from the central section of the site where they have previously been observed feeding and potentially nesting. As the southern expanses of the project site become less suitable either through the influence of development, or simply the degradation of the habitat through current land management practices, it is anticipated that BTF will migrate to the northern section.

The combination of habitat restoration (weed and pest control) and grazing management (including early wet season spelling) in the northern section and the incremental development in the southern section will allow for the passive relocation of the BTF, which should ultimately allow for an improvement in viability for local BTF populations within the Project site.

The objectives of this MDPRP are to:

- detail actions and procedures to be followed to mitigate adverse impacts of the development on the BTF;
- contribute to regional management of the BTF and other locally occurring fauna species, through the collection and contribution of important data on the species' movement, behaviour, and population numbers;
- expand existing knowledge of the life history and ecology of the BTF at the Project site and at a regional level, including whether the BTF is using specific habitat, selective waters, and a particular location at or near the Project site or if they are using a variety of habitats, a variety of waters and general areas; and



- determine the viability and success of mitigation driven passive relocation programs for the BTF and other threatened species in Australia.

A key component of this MDPRP is the long-term adaptive monitoring program (outlined in Section 8) that will inform the success of the program in achieving the performance indicators and proposed management actions.

In addition, BTF monitoring data collected from the Project site and surrounding areas will help refine and improve the BTF management actions over time and therefore maximise the effectiveness of the plan for conservation of the species.

Key inputs into the development of this MDPRP include:

- the Significant Impact Guidelines for the Endangered Black-throated Finch *Poephila cincta cincta*^{23,24},
- National Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta*²⁵; and
- Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt north region²⁶.

1.6 Structure of this plan

The structure of this plan and an overview of the content contained within each section has been outlined below:

- Section 1 Introduction – This section provides a brief overview of the Project and the purpose of the mitigation driven passive relocation plan for the Black-throated Finch.
- Section 2 Legislative context – This section provides an overview of the relevant legislation, guidelines and approval conditions applicable to the project.
- Section 3 Species overview – This section provides an overview of the Black-throated Finch including distribution, habitat and recognised threats

²³ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

²⁴ DEWHA (2009b), Significant impact guidelines for the endangered Black-throated finch (southern) (*Poephila cincta cincta*): National threatened species and ecological communities, EPBC Act policy statement 3.13. Australian Government, Canberra

²⁵ Black-throated Finch Recovery Team (BTF Recovery Team) (2004), Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta*. Hurstville, NSW: Department of Environment and Conservation; and Brisbane, Queensland: Queensland Parks and Wildlife Service

²⁶ Natural Resource Assessments Environmental Consultants Pty Ltd (2011), Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt North Bioregion, A project funded by the Black-throated Finch Trust, August 2011



- Section 4 Overview of Environmental Impact Assessment – This section provides a brief summary of the outcomes from the Environmental Impact Assessment
- Section 5 Mitigation driven passive relocation plan – This section outlines the mitigation and management actions that will be implemented to facilitate the passive relocation of the Black-throated Finch to the northern section of the site and the performance targets relevant to the management and monitoring
- Section 6 Monitoring – This section outlines the monitoring that will be undertaken to assess the success of the management and mitigation actions
- Section 7 Timing and implementation of the plan – This section details the anticipated timeframes for achieving the performance outcomes.
- Section 8 Adaptive management framework – This section outlines the adaptive management framework and the relationship between monitoring, management actions and increased knowledge of Black-throated Finch in the Project site
- Section 9 References – Provides a summary of the key documents utilised during preparation of this mitigation driven passive relocation plan.

1.7 Relationship to other management plans

A number of other management plans developed or to be developed for the Project will also be relevant to the management of BTF and should be read in conjunction to this MDPRP. Other Project management plans include, but are not necessarily limited to, the following:

1. Black River Environment Management and Rehabilitation Plan (required as a condition of the preliminary development approval);
2. Vegetation Management Master Plan;
3. Stormwater Quality Management Plan;
4. Erosion and Sediment Control Plan;
5. Weed and Pest Management Plan; and
6. Landscape Plan.

Mitigation Driven Passive Relocation Plan

Sanctum West



Further details of the key elements for each of the abovementioned plans have been outlined in the Environmental Impact Assessment Report²⁷.

²⁷ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty



2. Legislative considerations

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Commonwealth's principal piece of environmental law. It provides a national framework for the protection of the Australian environment and its unique biodiversity. Specifically, the EPBC Act aims to protect the environment by reducing significant impacts to Matters of National Environmental Significance (MNES).

The BTF (southern) is listed as endangered under the EPBC Act and is a MNES. Therefore, it is important that the Project avoids, manages, and mitigates impacts on the BTF as far as practicable.

2.1.2 Compliance with the EPBC

This MDPRP was designed in accordance with and to address the key principles of the *Environmental Management Plan Guidelines, Commonwealth of Australia*.

2.2 Queensland legislation

2.2.1 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) provides for the conservation of nature through protection of all native plants and animals in Queensland. Protection is provided under the NC Act through conservation of land as protected areas and wildlife protection outside of protected areas. Actions impacting on protected native flora and fauna are regulated under the NC Act²⁸. Permits for disturbance to native flora and fauna can be administered under the NC Act. The Queensland *Nature Conservation (Wildlife) Regulation 2006* (NC Regulation) is subordinate to the NC Act and lists flora and fauna species considered to be extinct in the wild, endangered, vulnerable, near threatened or special least concern in Queensland. The BTF is listed as endangered under the *Nature Conservation Act 1992*.

2.2.2 Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) provides a framework for the regulation of woody, terrestrial native vegetation located outside of protected areas. The VM Act provides for the establishment and mapping

²⁸ Department of Environment and Heritage Protection (2017, Threatened Species, accessed online at <https://www.ehp.qld.gov.au/wildlife/threatened-species/>, 20 August 2017



of Regional Ecosystems (REs) that encompass vegetation community descriptions within a geological and bioregional context. The BTF is dependent upon a number of REs as they represent high value habitat for feeding and nesting. Details on what clearing activities require assessment under the VM Act are provided under the regulations of the *Planning Act 2016*.

2.3 National recovery plan

The National Recovery Plan for the BTF was adopted under the EPBC Act on 8 January 2008²⁹. The aim of this plan is to manage and protect the BTF and its habitat, and to promote the recovery of the southern subspecies³⁰. Management and monitoring of impacts to the BTF seek to contribute to the recovery of the subspecies, as per the objectives of the National Recovery Plan for the BTF³¹.

Examples of recovery actions, documented in the National Recovery Plan for the BTF, that have been incorporated into this MDRP include:

- investigate breeding requirements and threats to key breeding areas (Action 1.1);
- investigate feeding and other habitat requirements (Action 1.2);
- undertake targeted surveys (to identify habitat) (Action 2.4);
- secure selected sites for conservation (Action 3.1);
- address threats on grazing lands (Action 3.2); and
- monitor management effectiveness (Action 3.3).

²⁹ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

³⁰ Black-throated Finch Recovery Team, Department of Environment and Climate Change (NSW) and Queensland Parks and Wildlife Service (2007), National recovery plan for the Black-throated finch southern subspecies *Poephila cincta cincta*. Report to the Department of the Environment and Water Resources, Canberra. Department of Environment and Climate Change (NSW), Hurstville and Queensland Parks and Wildlife Service, Brisbane

³¹ Black-throated Finch Recovery Team, Department of Environment and Climate Change (NSW) and Queensland Parks and Wildlife Service (2007), National recovery plan for the Black-throated finch southern subspecies *Poephila cincta cincta*. Report to the Department of the Environment and Water Resources, Canberra. Department of Environment and Climate Change (NSW), Hurstville and Queensland Parks and Wildlife Service, Brisbane



2.4 Significant impact guidelines

The Significant impact guidelines for the endangered Black-throated Finch (southern) (*Poephila cincta cincta*) is an Australian Government policy statement designed to assist in determining whether a proposed action is likely to have a significant impact on the BTF³².

The key management actions identified in the Significant Impact Guidelines (which are also derived from the Recovery Plan) that are relevant to this MDPRP include the need to:

- identify and quantify threats;
- investigate breeding requirements and threats to key breeding areas;
- investigate feeding and other habitat requirements;
- quantify distribution and abundance, and therefore document sightings;
- undertake mapping and habitat modelling;
- undertake targeted surveys; and
- monitor management effectiveness.

Management actions, and the monitoring that provides information for the management, will be based largely on these main themes, but may be expanded according to existing and new local knowledge of BTF within the Project Site.

2.5 Approvals and permits

The proposed action has received an approved Development Approval for Preliminary Approval - Material Change of Use for Development in Accordance with a Plan of Development for Residential and Open Space Land Use. The Development Approval was issued under the *Sustainable Planning Act 2009*.

2.5.1 Approval conditions

Condition 16 of the Preliminary Approval requires the proponent to prepare and submit a Black River Environmental Management and Rehabilitation Plan (BREM RP), to protect the existing riparian vegetation and habitat linkages. It is anticipated that this MDPRP will be closely tied to the actions in the BREMRP, which also involved rehabilitation and weed management of the conservation area.

³² Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra



3. Black-throated Finch species overview

3.1 Description of the Black-throated Finch (southern)

The BTF is a sleek but thickset grass-finch, which measures approximately 12 cm in length, and weighs approximately 15g³³. It has a grey head and neck, with a short black loreal stripe, and a conspicuous, large black 'bib' over the chin, throat, and upper breast. The bill is short, thick, conical, and coloured black. The eye is a dark reddish-brown. The breast, back, and most of the belly, are brown³⁴. The wings are a darker shade of brown, and when folded have a narrow white stripe along the leading edge. The rump and the tail, which is short and rather rounded or square-tipped, are both black. The lower underbody is white, but with a black patch on the rear flanks. The legs and feet are a bright pinkish-red. Juveniles appear very similar to adults, but with duller colouring^{35,36}.

The BTF is predominantly a sedentary, gregarious bird that typically forages in groups of up to 30 individuals^{37,38}. During the breeding season (in the Townsville region breeding coincides with wet season (February to May)), only small daily movements between forage sites are made³⁹. However, movements of up to 3km a day may occur during periods where forage resources are scarce. Larger movements are thought to be related to periods of drought and/ or when water availability is reduced⁴⁰. BTF often form loose breeding colonies, where a number of nests are made in a single tree, or in neighbouring trees. The average clutch size is five, with chicks reaching sexual maturity at six months⁴¹.

3.2 Ecology

³³ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

³⁴ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

³⁵ Higgins, P.J., J.M. Peter & S.J. Cowling, eds. (2006), Boatbill to Starlings. In: Handbook of Australian, New Zealand and Antarctic Birds. 7. Melbourne: Oxford University Press

³⁶ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

³⁷ Black-throated Finch Recovery Team, Department of Environment and Climate Change (NSW) and Queensland Parks and Wildlife Service (2007), National recovery plan for the Black-throated finch southern subspecies *Poephila cincta cincta*. Report to the Department of the Environment and Water Resources, Canberra. Department of Environment and Climate Change (NSW), Hurstville and Queensland Parks and Wildlife Service, Brisbane

³⁸ DEWHA (2009b), Significant impact guidelines for the endangered Black-throated finch (southern) (*Poephila cincta cincta*): National threatened species and ecological communities, EPBC Act policy statement 3.13. Australian Government, Canberra

³⁹ DEWHA (2009b), Significant impact guidelines for the endangered Black-throated finch (southern) (*Poephila cincta cincta*): National threatened species and ecological communities, EPBC Act policy statement 3.13. Australian Government, Canberra

⁴⁰ DEWHA (2009b), Significant impact guidelines for the endangered Black-throated finch (southern) (*Poephila cincta cincta*): National threatened species and ecological communities, EPBC Act policy statement 3.13. Australian Government, Canberra

⁴¹ DEWHA (2009b), Significant impact guidelines for the endangered Black-throated finch (southern) (*Poephila cincta cincta*): National threatened species and ecological communities, EPBC Act policy statement 3.13. Australian Government, Canberra



3.2.1 Breeding

In the wild, the life expectancy of Australian finches is said to be four to six years⁴². No information is available on the age/s of natural mortality. The BTF generation length is estimated at two years, however, this estimate is considered of low reliability due to a lack of life history data⁴³.

Breeding can occur throughout the year under optimal conditions and varies throughout its range^{44,45,46}. In the Townsville area, breeding typically occurs during the wet season, usually between February and May^{47,48,49}. In other parts of their range, eggs are laid mainly from August to December, but clutches have also been recorded in March, April and July^{50,51,52,53}.

The nests are often built in a hollow branch of a tree, or in a fork of a tree, shrub or sapling. However, it is not uncommon for nests to be placed in other sites, such as in tall grass, amongst mistletoe, beneath active raptor nests, or in an old nest of a Babbler (*Pomatostomus spp.*) or Diamond Firetail (*Stagonopleura guttata*)^{54,55}. Nest sites tend to be located in close proximity to water. Near Townsville, the average distance of nest sites from semi-permanent water has been found to be 280 m⁵⁶, and the average distance of nest

⁴² Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

⁴³ Garnett, S.T. & G.M. Crowley (2000), The Action Plan for Australian Birds 2000. Canberra, ACT: Environment Australia and Birds Australia. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/action/birds2000/index.html>

⁴⁴ Mitchell, D.F (1996), Foraging Ecology of the Black-throated Finch *Poephila cincta cincta*. M.Sc. Thesis. Townsville: James Cook University of North Queensland

⁴⁵ Higgins, P.J., J.M. Peter & S.J. Cowling, eds. (2006), Boatbill to Starlings. In: Handbook of Australian, New Zealand and Antarctic Birds. 7. Melbourne: Oxford University Press

⁴⁶ Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black-throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

⁴⁷ Mitchell, D.F (1996), Foraging Ecology of the Black-throated Finch *Poephila cincta cincta*. M.Sc. Thesis. Townsville: James Cook University of North Queensland

⁴⁸ Higgins, P.J., J.M. Peter & S.J. Cowling, eds. (2006), Boatbill to Starlings. In: Handbook of Australian, New Zealand and Antarctic Birds. 7. Melbourne: Oxford University Press

⁴⁹ Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black-throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

⁵⁰ Mitchell, D.F (1996), Foraging Ecology of the Black-throated Finch *Poephila cincta cincta*. M.Sc. Thesis. Townsville: James Cook University of North Queensland

⁵¹ Morris, A.K., A.R. McGill & G. Holmes (1981), Handlist of Birds in New South Wales. Sydney: NSW Field Ornithologists Club

⁵² Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane

⁵³ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

⁵⁴ Campbell, A.J. (1974), Nests and Eggs of Australian Birds: Including the Geographical Distribution of the Species and Popular Observations Thereon. Melbourne: Wren

⁵⁵ Baldwin, M. 1976. Distribution of the Black-throated Finch. Australian Birds 11: 13–14

⁵⁶ Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane



sites from permanent water is 400 m⁵⁷. Studies near Townsville have also found that nests become inactive (which presumably implies that breeding failed) when nests are destroyed by predators or exposed to wind and heavy rainfall associated with storms⁵⁸.

BTF nests are oval in shape and have a spout-like entrance (an arrangement also described as 'bottle-shaped'). They are usually composed of grass⁵⁹. In addition to their breeding nests, BTF also build non-breeding nests that are used for roosting during the non-breeding and (sometimes) breeding periods.

3.2.2 Feeding

BTF require habitat where there is access to seeding grasses and water, and will utilize a variety of different habitats for foraging, particularly in north Queensland during the wet season, and there appears to be some seasonal variation in the diet^{60,61,62,63}.

At the species level, BTF feed mainly on the half-ripe seeds of grasses (for example, *Dactyloctenium*, *Digitaria*, *Eremochloa*, *Paspalidium*, *Setaria*), and less often on the seeds of other plants (for example *Stylosanthes*). They also eat insects (for example termites) and their larvae, especially during the wet (breeding) season^{64,65}.

BTF take seeds from the ground or from inflorescences. They obtain most of their food by pecking seeds from the ground. However, they will also reach or jump up to take seeds from low inflorescences, perch on stems to take seeds from inflorescences, perch on grass stems and use their body weight to bring the stems to the ground to feed, and reach for inflorescences from perches other than the food plant⁶⁶.

⁵⁷ Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane

⁵⁸ Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane

⁵⁹ Campbell, A.J. (1974), *Nests and Eggs of Australian Birds: Including the Geographical Distribution of the Species and Popular Observations Thereon*. Melbourne: Wren

⁶⁰ Mitchell, D.F (1996), *Foraging Ecology of the Black-throated Finch *Poephila cincta cincta**. M.Sc. Thesis. Townsville: James Cook University of North Queensland

⁶¹ Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane

⁶² Black-throated Finch Recovery Team, Department of Environment and Climate Change (NSW) and Queensland Parks and Wildlife Service (2007), *National recovery plan for the Black-throated finch southern subspecies *Poephila cincta cincta**. Report to the Department of the Environment and Water Resources, Canberra. Department of Environment and Climate Change (NSW), Hurstville and Queensland Parks and Wildlife Service, Brisbane

⁶³ Zann, R. (1976), 'Distribution, status and breeding of Black-throated finches *Poephila cincta* in northern Queensland', *Emu* 76: 201-206

⁶⁴ Black-throated Finch Recovery Team (BTF Recovery Team) (2004), *Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta**. Hurstville, NSW: Department of Environment and Conservation; and Brisbane, Queensland: Queensland Parks and Wildlife Service

⁶⁵ Zann, R. (1976), 'Distribution, status and breeding of Black-throated finches *Poephila cincta* in northern Queensland', *Emu* 76: 201-206

⁶⁶ Mitchell, D.F (1996), *Foraging Ecology of the Black-throated Finch *Poephila cincta cincta**. M.Sc. Thesis. Townsville: James Cook University of North Queensland



They drink by sucking, submerging their bills in water for a few seconds at a time. They tend to drink mainly in the early morning and late afternoon, especially when water is scarce, but at sites where water is abundant small numbers may drink throughout the day^{67,68}.

3.3 Distribution

3.3.1 Regional distribution

The BTF has experienced a large decline in range in recent decades⁶⁹. Where it was once previously found throughout eastern and central Queensland north of the New South Wales border, it is now only known from the Townsville region and scattered sites in central Queensland. The extent of occurrence of the BTF has declined by approximately 80% since the 1980s, with the majority of this decline in the range of the endangered southern subspecies⁷⁰.

3.3.2 Local distribution

The Townsville region is considered one of the last remaining strongholds for the species as it contains suitable habitat – grass, open woodlands, and forests along or near watercourses. The species is generally considered extinct at sites south of the Burdekin River, and used to occur in southeast Queensland and northern New South Wales, although it hasn't been recorded since the 1940's and 1960's respectively⁷¹.

The proposed action is situated on the fringes of an urban expansion area to the north of Townsville, of which most of the land to the east – south-east is approved development or has been constructed. One of the last remaining expanses of natural habitat situated between Northshore, Mount Low, and Bushland Beach was recently approved (October 2016) for development under the EPBC Act (EPBC 2012/6351) - Mount Low Developments Master Planned Community.

Adjacent to the immediate north, the site is characterised by estuarine wetland habitats associated with Low Creek and Black River⁷². A saltmarsh wetland occurs in the north of the project site although is not part of

⁶⁷ Immelmann, K. (1982), Australian Finches in Bush and Aviary. Sydney: Angus & Robertson

⁶⁸ Zann, R. (1976), 'Distribution, status and breeding of Black-throated finches *Poephila cincta cincta* in northern Queensland', Emu 76: 201-206

⁶⁹ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

⁷⁰ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

⁷¹ Department of the Environment and Energy (2017), Species Profile and Threats Database – *Poephila cincta cincta* – Southern Black-throated finch, accessed online at http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64447, 20 August 2017

⁷² Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty



the proposed clearing area. To the west, Black River borders the proposed action and provides areas of riparian habitat in varying condition. South of the development the Bruce Highway fragments further areas of remnant open woodlands, with regional ecosystems suitable for the BTF.

BTF populations are declining locally due to increasing development and impacts from poor land management⁷³. Previous surveys in the adjacent development sights provide evidence of declining and withdrawing populations. The surrounding environment is mainly comprised of RE 11.3.12 and RE 11.3.35, both of which are ideal Black-throated Finch habitat. To the south of the project site, particularly to the south of the suburb Jensen, large continuous patches of suitable habitat are present. It is likely that the Bruce Highway fragments the project site from the woodlands to the south, essentially reducing the capability of BTF from moving between these areas. However, it is possible that the riparian vegetation along Black River and some of the smaller watercourses entering the Townsville Common Conservation Park, may act as movement corridor for BTF.

The BTF population associated with the proposed action development area, is part of a regional distribution of BTF, which occurs between the Pinnacles Range, and the coastline, bordered by the Bohle and Black Rivers^{74,75}. Within this area, BTF habitat is most likely to comprise vegetation communities mapped as RE11.3.12, RE11.3.35, RE11.3.25, and RE11.3.30 based on assessments undertaken to inform developments throughout the region⁷⁶. BTF populations are reliant on suitable vegetation near seasonal water sources during the breeding season and permanent water sources during the dry season. Given the species biology and the Townsville regions dry climate, areas which hold permanent water are important to populations which exist in the region.

3.4 Habitat overview

The Black-throated Finch (southern) occurs mainly in grassy, open woodlands and forests, typically dominated by Eucalyptus, Corymbia and Melaleuca, and occasionally in tussock grasslands or other habitats

⁷³ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

⁷⁴ Buosi P., Anderson, T. and Steyn, K. (2013), Townsville Ring Road Section 4 Project Black-throated Finch (*Poephila cincta cincta*) Supplementary Assessment December 2012 and April 2013, Natural Resource Assessments Pty Ltd, Townsville

⁷⁵ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

⁷⁶ Buosi P., Anderson, T. and Steyn, K. (2013), Townsville Ring Road Section 4 Project Black-throated Finch (*Poephila cincta cincta*) Supplementary Assessment December 2012 and April 2013, Natural Resource Assessments Pty Ltd, Townsville



(for example freshwater wetlands), often along or near watercourses, or in the vicinity of water^{77,78,79,80,81}). Almost all recent records of the finch from south of the tropics have been in riparian habitat^{82,83,84}. The subspecies is thought to require a mosaic of different habitats in which it can find seed during the wet season⁸⁵.

Some of the more common species of eucalypts in woodlands and forests frequented by the subspecies include Narrow-leaved Ironbark (*E. crebra*), River Red Gum (*E. camaldulensis*), Silver-leaved Ironbark (*E. melanophloia*), Reid River Box (*E. brownii*), Yellowjacket (*E. similis*) and Forest Red Gum (*E. tereticornis*). The subspecies also occurs in Melaleuca woodlands, or in grasslands comprised of genera such as *Astrelba*, *Dichanthium* or *Panicum*⁸⁶. It has occasionally been recorded in other habitats, including in freshwater wetlands⁸⁷, in cultivation surrounded by woodland, and in a heavily grazed paddock⁸⁸.

⁷⁷ Baldwin, M. 1976. Distribution of the Black-throated Finch. *Australian Birds* 11: 13–14.

⁷⁸ Black-throated Finch Recovery Team (BTF Recovery Team) (2004), Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta*. Hurstville, NSW: Department of Environment and Conservation; and Brisbane, Queensland: Queensland Parks and Wildlife Service

⁷⁹ Ley A. & S. Cook (2001), The Black-throated Finch *Poephila cincta* in New South Wales in *Australian Bird Watcher* 19:115-120

⁸⁰ Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane

⁸¹ Wieneke, J. (1989), *Birds of Townsville and Where to Find Them*. Townsville: Wildlife Preservation Society of Queensland

⁸² Baldwin, M. 1976. Distribution of the Black-throated Finch. *Australian Birds* 11: 13–14.

⁸³ Black-throated Finch Recovery Team (BTF Recovery Team) (2004), Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta*. Hurstville, NSW: Department of Environment and Conservation; and Brisbane, Queensland: Queensland Parks and Wildlife Service

⁸⁴ Ley A. & S. Cook (2001), The Black-throated Finch *Poephila cincta* in New South Wales in *Australian Bird Watcher* 19:115-120

⁸⁵ Mitchell, D.F (1996), Foraging Ecology of the Black-throated Finch *Poephila cincta cincta*. M.Sc. Thesis. Townsville: James Cook University of North Queensland

⁸⁶ Black-throated Finch Recovery Team (BTF Recovery Team) (2004), Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta*. Hurstville, NSW: Department of Environment and Conservation; and Brisbane, Queensland: Queensland Parks and Wildlife Service

⁸⁷ Black-throated Finch Recovery Team (BTF Recovery Team) (2004), Recovery Plan for the Black-throated Finch Southern Subspecies *Poephila cincta cincta*. Hurstville, NSW: Department of Environment and Conservation; and Brisbane, Queensland: Queensland Parks and Wildlife Service

⁸⁸ Ley A. & S. Cook (2001), The Black-throated Finch *Poephila cincta* in New South Wales in *Australian Bird Watcher* 19:115-120



3.4.1 Critical Resources – water

The lifecycle of the BTF is dependent on the availability of both permanent and seasonal water bodies^{89,90,91}. Individuals need to drink at least daily and numerous times throughout the day during dry periods⁹². BTF use both natural and artificial water sources, including wetlands, creeks, dams, and stock troughs. Permanent water sources are the most critical limiting resource, as they provide refuge habitat during the dry season. Ephemeral water sources are also important to the lifecycle of the finch, allowing greater access to areas of foraging and nesting habitat during the wet season. With the onset of the wet season and proliferation of seasonal water bodies and seeding grasses, the finches move from their dry season refuge into habitat surrounding these water sources⁹³. During the breeding season, BTF typically nest in trees located within 400m of seasonal water sources (NRA, 2007a), therefore the presence of suitable trees close to seasonal water sources is critical for the black-throated finch (southern)⁹⁴.

3.4.2 Critical Resources – nesting and foraging

BTF predominantly feed on fallen grass seed, and require year-round access to a variety of grass species (DEWHA, 2009a). Grass species that are considered to be important forage species for Black-throated Finch (southern) include *Urochloa mosambicensis*, *Enteropogon acicularis*, *Panicum decompositum*, *Panicum effusum*, *Dichanthium sericeum*, *Alloteropsis semialata*, *Eragrostis sororia* and *Themeda triandra*⁹⁵.

⁸⁹ Natural Resource Assessments Environmental Consultants (NRA) (2005), Enertrade North Queensland Gas Pipeline Black-throated Finch Studies (Post-Construction). Unpublished report prepared for Enertrade, Brisbane

⁹⁰ Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black-throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

⁹¹ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

⁹² Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

⁹³ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered Black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

⁹⁴ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

⁹⁵ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra



Foraging habitat and dietary preferences are thought to vary seasonally with changing food availability⁹⁶. During the breeding season, when seeding grasses are abundant, birds forage in close proximity to the nesting site⁹⁷. As conditions dry out and grass seed abundance declines, individuals must forage more widely. In the Townsville region, there is believed to be a critical foraging resource bottleneck at the start of the wet season (November to December), when existing fallen seed germinates, but new seed has yet to be produced⁹⁸. The presence of grass species which produce seed early in the wet season (typically early flowering perennials) are likely to be essential for the survival of the Black-throated Finch (southern)⁹⁹. This is likely to be the case for the local Sanctum West population.

The BTF nest site selection is more closely related to tree location than to tree structure itself¹⁰⁰. Individuals are known to nest in a range of structures (that is, pendulous branches, hollow tree limbs, at the base of active raptor nests, bushy shrubs) however, it is the proximity and connectivity of the nesting site to water and foraging resources that is critical. In the Townsville region, the subspecies typically nest within 400m of a water source, and is rarely seen more than one km from permanent water during the breeding season. Nesting sites also need to be near foraging habitat as observations suggest that during the breeding season the subspecies travels smaller distances than it does during the dry season^{101,102}.

3.4.3 Previous surveys

Austecology conducted a series of five separate Black-throated Finch survey events, covering early to later-wet season conditions, from December 2012 to May 2013. A total of 23.5 survey hours were conducted whilst on the project site. A summary of the results of those surveys is provided here:

⁹⁶ Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black- throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

⁹⁷ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

⁹⁸ Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black- throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts

⁹⁹ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

¹⁰⁰ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra

¹⁰¹ Mitchell, D.F (1996), Foraging Ecology of the Black-throated Finch *Poephila cincta cincta*. M.Sc. Thesis. Townsville: James Cook University of North Queensland

¹⁰² Natural Resource Assessments Environmental Consultants Pty Ltd (2007), Review of the Ecology, Threats and Management Requirements of the Black- throated Finch (*Poephila cincta cincta*) to Support Assessment Process Under the Environment Protection and Biodiversity Conservation Act 1999. Report prepared by NRA Environmental Consultants for Department of Environment, Water, Heritage and the Arts



- Approximately 129 cumulative BTF sightings occurred within the project site, predominately in the central section with the maximum recorded population being 16 birds¹⁰³.
- The species was repeatedly observed foraging near the centre of the project site, primarily within non-remnant vegetation (87% of observations).
- BTFs were also observed travelling to and from the northern section of the project site. It was noted that on the project site, BTFs gathered in areas with low sparse vegetation and areas near a water source (decommissioned ponds).
- 83% of observations being made during the late dry season.
- Several incomplete and destroyed nests were identified and attributed to BTFs, although no direct evidence was recorded of BTF breeding¹⁰⁴.
- Fledgling BTFs were observed during surveys, indicating that successful breeding may have occurred on the project site¹⁰⁴.
- Nests and fledglings were found in the central section of the project site, nearby to the foraging area¹⁰⁴. Though, definitive breeding on the project site was not confirmed.
- BTFs only persist at any density within the proposed development site because of the paucity of diversity and overgrazing of a particular area.
- Evidence suggests that the habitat in question will not sustain the population in the short or long term and existence in the broader regional landscape is declining (at least in the east).

Figure 3 shows the location where most of the BTF sightings occurred during the Austecology surveys in relation to the proposed development.

¹⁰³ Agnew, L. 2014. Black-throated Finch *Poephila cincta* Assessments – Lots 267 EP1719 and 256 SP196179 Townsville, Report prepared for Glen Maidment Platinum Developments, Austecology, Brisbane.

¹⁰⁴ Agnew, L. 2014. Black-throated Finch *Poephila cincta* Assessments – Lots 267 EP1719 and 256 SP196179 Townsville, Report prepared for Glen Maidment Platinum Developments, Austecology, Brisbane.

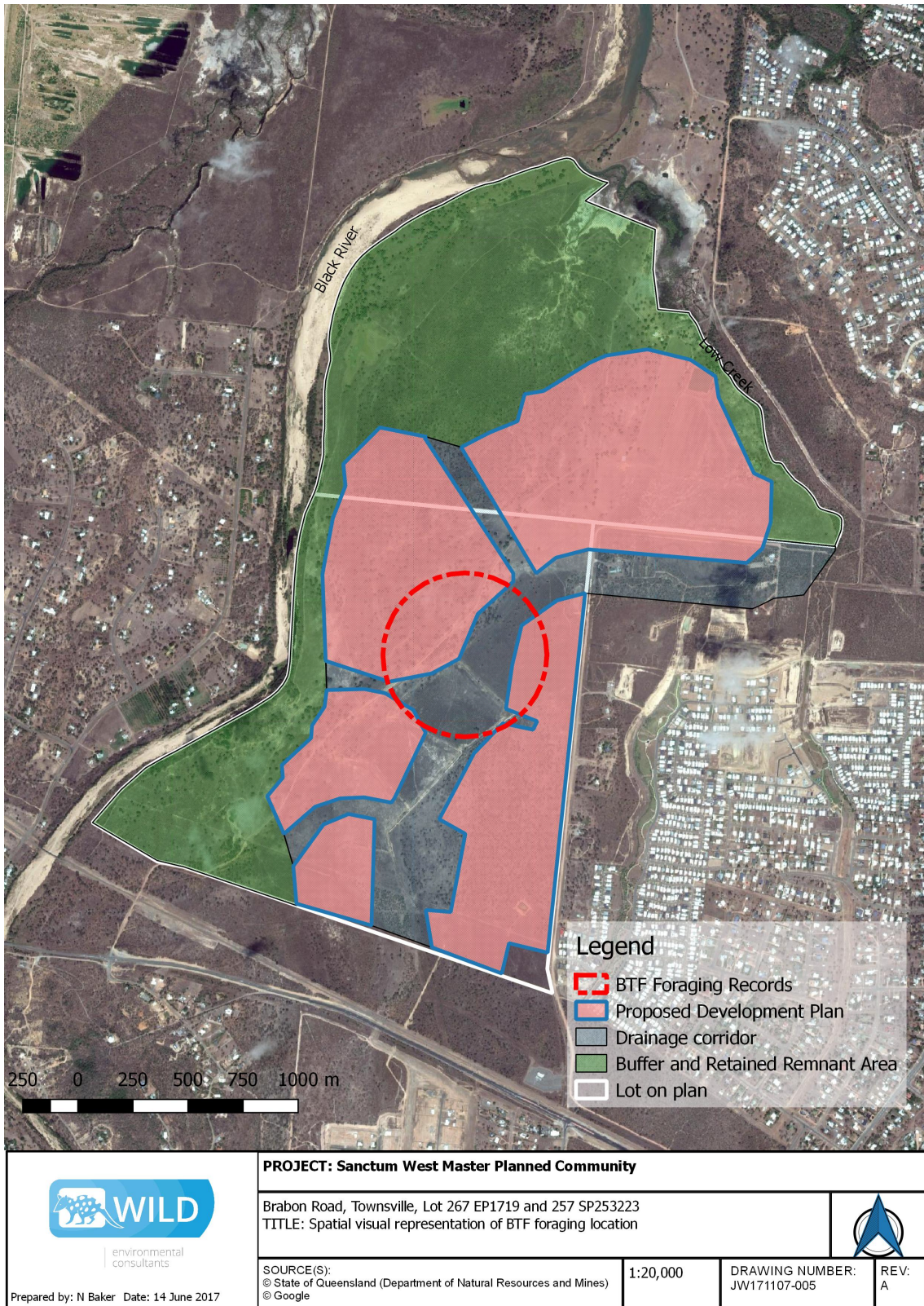


Figure 3. Location of most of the BTF Sightings from the Austecology Surveys in relation to the development.

4. Overview of Environmental impact assessment



4.1 Threats and impacts of the Project

Potential direct impacts of the proposed action are associated with the clearing of approximately 390 ha of vegetation to construct residential housing and associated infrastructure. The clearing will consist of:

- 299.65 ha of non-remnant vegetation; and
- 88.39 ha of native remnant vegetation.

Remnant regional ecosystems affected include least concern vegetation communities described as RE11.3.12, RE11.3.35, RE11.3.25b, and RE11.1.2a. Potential impacts due to the clearing may include the loss and degradation of terrestrial woodland habitat and any species of concern associated with the habitat, noise, vibration, and light impacts, injury, and/or mortality of fauna associated with the vegetative habitat. The potential impacts are principally associated with the initial construction phase activities, and therefore, management measures will focus on construction related impacts.

4.1.1 Avoidance of impacts

The development layout shown in the approved development plan is a result of careful design selected to avoid and/or minimise impacts on the BTF, while enhancing habitat connectivity and flood immunity. Avoidance measures to address these issues include:

- maintaining a riparian buffer of minimum of 100 m at a minimum along Low Creek and Black River;
- maintaining areas of remnant vegetation considered important for the future viability of BTF within the project site; and
- maintaining hydrological connectivity and open space between the eastern and western sides of the development as a drainage corridor.

These measures will avoid impacts, in part, to habitat utilised by species of conservation significance, including the BTF, and minimise impacts on the onsite and downstream aquatic environments, including the Great Barrier Reef Marine Park.

The avoidance of clearing some areas of remnant vegetation will support ecosystem functions such as habitat production, food source, runoff sequestration, involvement in various biogeochemical cycles and soil development¹⁰⁵. Approximately 66.52% (175.61 ha) of the total remnant vegetation on the project site will be preserved.

¹⁰⁵ Van der Maarel, E. & Franklin, J. (2012), *Vegetation Ecology*, 2nd edn, Wiley, Chichester



Conserving the riparian buffers along Black River and Low Creek will regulate overland flow and prevent large quantities of sediment and nutrients entering downstream aquatic ecosystems. This avoidance measure is a critical mechanism for the development to reduce its impacts upon the GBRMP, GBRWHA and GBRNHA. Habitat fragmentation is a major threat to biodiversity in Australia¹⁰⁶. The preservation of the riparian buffers serves a dual purpose and will act as a wildlife corridor maintaining connectivity between habitats. The wildlife corridor on the project site will run from the eastern section along Low Creek to the northern section and down along Black River to the southwest corner. This design allows species to utilise the entire remaining habitats. The design acts on the advice provided in the Austecology BTF report (2014), which advises to retain habitat between Black River and Low Creek to maximising connectivity. Maintaining habitat along Black River is also significant because it facilitates connectivity to the extensive habitats around the Yabulu Nickel Refinery. This avoidance measure will effectively alleviate the pressures of habitat loss and ultimately assist the longevity of local biodiversity. Table 1 outlines the potential impacts to the BTF that are relevant to the proposed action.

Table 1. Key potential impacts of the proposed action on the local BTF population.

Impacts	Potential impacts associated with the Project	Project phase
Habitat Loss and Degradation	<ul style="list-style-type: none"> - Habitat for the BTF on site consisted predominantly of highly modified non-remnant land, made suitable temporarily due to overgrazing. Remnant habitat remaining in the northern section of the property is in a degraded state. - Impacts of the clearing are not expected or planned until between 2021 and 2029 in accordance with the Approved Staging Plan. Uncertainty about the BTFs ability to persist in the area raises questions as to whether there will be an impact from the development at that time. It is possible that prior to any construction taking place, the local population may not be present in the area, and it is important to note that they have not been confirmed within the site since 2014. Nevertheless, based on the existing information, reduction in foraging habitat is expected as a result of the development. 	Construction and post-construction impacts

¹⁰⁶ Abensperg-Traun, M., Smith, G.T., Arnold, G.W. and Steven, D.E., (1996), The effects of habitat fragmentation and livestock-grazing on animal communities in remnants of gimlet *Eucalyptus salubris* woodland in the Western Australian wheatbelt. I. Arthropods. *Journal of Applied Ecology*, pp.1281-1301



Impacts	Potential impacts associated with the Project	Project phase
	<ul style="list-style-type: none"> - Changes in land management between now and the start of development may reduce the likelihood of any impacts from the development. Further studies prior to the development would be required to understand the current condition of the population. 	
<p>Habitat Fragmentation</p>	<ul style="list-style-type: none"> - Habitat corridors identified as important for maintaining connectivity for the species will be maintained on site along Black River and Low Creek. These corridors are in addition to riparian vegetation along Black River outside the property boundaries. These corridors prevent impacts of localised onsite habitat fragmentation, which can be a legitimate ecological threat as the BTF is considered a sedentary species (Ley & Cook 2001). - The project site is situated such that the entire eastern and south-eastern aspects are surrounded by other urban developments. There are minor weak connections with habitats to the east, specifically, remnant woodlands on freehold properties and to a lesser extent, the Townsville Town Common Conservation Park. It is further acknowledged that the last remaining native vegetation area in Mount Low (Lot 93 on SP222103), has recently received approval for development. - At present, the project site maintains a strong connection with habitats to the west of Black River, specifically, habitats around the Yabulu Nickel Refinery. This connection will be maintained following the development of Sanctum West as clearing will be avoided around western boundaries of the project site. 	<p>Construction</p>
<p>Direct Injury / Mortality</p>	<ul style="list-style-type: none"> - Direct mortality during clearing is not considered to constitute a significant impact. Finches are likely to flee the area during clearing activities. Clearing of finch habitat during the breeding season may result in destruction of nests, eggs, and nestlings. 	<p>Construction</p>

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Impacts	Potential impacts associated with the Project	Project phase
Invasive Weeds	<ul style="list-style-type: none">- The spread of exotic grasses is a potential impact for this species. Generally, impacts from construction and clearing can occur from weeds proliferating from the cleared area to the uncleared areas. Although BTF are known to forage on some exotic grasses, the excessive growth of invasive grasses can inhibit their foraging potential. The project site is already majorly infested with a range of invasive weeds, which degrade its habitat. Appropriate management of exotic pasture species can mitigate against this impact.	Pre-, during, and post-construction



5. Mitigation Driven Passive Relocation Plan

The result of the Environmental Impact Assessment was the recommendation to develop a Mitigation Driven Passive Relocation Plan. Following the assessment, it was agreed that the MDPRP was a natural consequence of the avoid, mitigate, offset impact assessment hierarchy. The MDPRP is proposed to mitigate against the pending loss of suitable resources for BTF, either caused by the development proceeding or by the progression of time and unmanaged grazing practices. The current ecological functioning of the Project site has and may continue to provide some resources for BTF, even in its degraded state. The MDPRP recognises that the habitat to be retained in the northern section of the property, contains habitat more suitable in the long term, if managed in a way which promotes its restoration.

5.1 BTF management objectives

The Habitat Management Guidelines for the Black-throated Finch in the Brigalow Belt North Bioregion (2011) define property-specific management guidelines to assist land managers in determining what actions can be taken on a property or within a landscape to conserve or enhance habitat suitable for the BTF. The three key objectives outlined in the guidelines are:

1. maintaining open woodlands with a grassy understorey that is dominated by native perennial and annual grasses. Grasses include a high proportion of early flowering perennial grasses such as Cockatoo Grass
 - achieved through implementation of effective grazing management practices, appropriate fire regimes, management (thickening) of woody vegetation, weed management and pest animal control programs;
2. maintaining water sources accessible to BTF near foraging habitat and near woody vegetation
 - achieved by preventing the loss of water sources and management water quality values; and
3. maintaining tall woody vegetation near foraging habitat and water
 - achieved through the preservation of mature woody trees, management practices to encourage natural recruitment of tree species and through the implementation of revegetation programs as required.

In order to prescribe appropriate management actions for a site, it is essential to understand BTF use of the area. For example, actions required to protect breeding habitat may differ from actions required to protect areas where BTF intermittently forage during the dry season¹⁰⁷. As a general guide, Table 2 summarises the important aspects of BTF ecology.

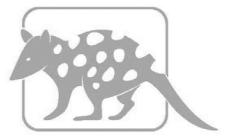
¹⁰⁷ Natural Resource Assessments Environmental Consultants Pty Ltd (2011), Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt North Bioregion, A project funded by the Black-throated Finch Trust, August 2011

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The site of the proposed action contains suitable foraging habitat, resulting from overgrazing of cattle for several decades, numerous potential drinking water sources and potential nesting habitat. Management and mitigation measures applicable to this site and project have been outlined in Section 5.



Month		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Season (six units)		W	W	LW	LW	ED	ED	D	D	LD	LD	EW	EW
Peak in Specific Behaviour													
Breeding	Egg laying and rearing dependent juveniles												
Movements	Movement localised to breeding site												
	Birds progressively range further												
	Some colonies contract to permanent water												
	Some colonies disperse to breeding area												
Critical Life History Stages													
Critical Periods	Resource bottleneck												
	Peak breeding period												
	Dry season stress												
Peak Periods for Seed Production													
Seed Production	Annual grass												
	Perennial grass (late flowering)												
	Perennial grass (early flowering)												
Recommended Management for Healthy BTF Habitat													
Grazing	Wet season spelling to protect grasses												
Fire	Patch burns every 5 yrs or more for asynchronous seeding												
EW = Early Wet Season ED = Early Dry Season W = Wet Season D = Dry Season LW = Late Wet Season LD = Late Dry Season													

Table 2. General timing of important life history stages and management actions for BTF in the Brigalow Belt North Bioregion (Source: Adapted from NRA, 2011¹⁰⁸).

¹⁰⁸ Natural Resource Assessments Environmental Consultants Pty Ltd (2011), Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt North Bioregion, A project funded by the Black-throated Finch Trust, August 2011



5.2 Performance indicators

5.2.1 Indicators

The following performance indicators will be used to monitor the success of the MDPRP in achieving its objectives:

- regular monitoring/audits (bi-annual) demonstrating implementation of the mitigation and management measures outlined herein;
- no net loss of BTF activity levels across the site;
- evidence of breeding and feeding in managed areas within the site;
- evidence of use of water sources (artificial and ephemeral) within the site;
- evidence of use of areas where any new water sources are relocated;
- no uncontrolled fires, no increase in predator or feral animal numbers and no increase in exotic pasture and weed distribution within existing high-quality habitat areas;
- reduction in weed abundance within quality habitat areas;
- increased native species diversity and abundance within quality habitat areas.



5.3 Passive relocation management

Reintroduction biology is a fast-emerging scientific field, which is facilitating the coexistence of humans and wildlife, in a non-traditional fashion¹⁰⁹. Reintroduction biology has facilitated the development of an array of mitigation-driven and conservation driven techniques, which enable the relocation of organisms. Although, many of the concepts of reintroduction biology originated from purely conservation orientated studies, today the concepts are predominately applied to mitigation-driven translocations^{110,111}.

Passive relocation is a proven environmental management method and is considered to be less risky than traditional translocation methods¹¹². Ecologists from North America were the first to employ passive relocation¹¹³ for a project where approximately 20 individuals of an endangered sedentary owl species (*Athene cunicularia*) were passively relocated to nearby undisturbed habitat as incoming urban developments threatened them. Animal translocations can be a risky process as well as very stressful for the subject animals. Translocations of animals, particularly avian, can often result in capture myopathy, a disease complex associated with capturing and handling wild animals, which can cause immediate mortality, reduced ecological fitness a range of health disorders^{114,115}. As the BTF is a very small and nimble species, capturing individuals would be logistically difficult and very stressful for the captured birds. Therefore, passive relocation is considered a more suitable option for this situation.

Although, the BTF is a sedentary species, during the non-breeding season (June-January) daily movements can exceed 3km¹¹⁶. The approximate distance from the central section to the northern section of the project site is less than 500 m.

Acknowledging that the central non-remnant section of the Project site provides some resources for a resident BTF population, the area is unique in that it is highly likely to be unstable and unsuitable for the BTF into the

¹⁰⁹ Sedden, P. J., Armstrong, D. P. and Maloney, R. F. (2007), Developing the Science of Reintroduction Biology. Conservation Biology, 21: 303–312

¹¹⁰ Sedden, P. J., Armstrong, D. P. and Maloney, R. F. (2007), Developing the Science of Reintroduction Biology. Conservation Biology, 21: 303–312

¹¹¹ Germano, J.M., Field, K.J., Griffiths, R.A., Clulow, S., Foster, J., Harding, G. and Swaisgood, R.R. (2015), Mitigation-driven translocations: are we moving wildlife in the right direction?. Frontiers in Ecology and the Environment, 13(2), pp.100-105

¹¹² Trulio, L.A. (1995), Passive Relocation: A Method to Preserve Burrowing Owls on Disturbed Sites (Relocalización Pasiva: Un Método Para Preservar Individuos de Speotyto cunicularia en Lugares Disturbados). Journal of Field Ornithology, pp.99-106

¹¹³ Trulio, L.A. (1995), Passive Relocation: A Method to Preserve Burrowing Owls on Disturbed Sites (Relocalización Pasiva: Un Método Para Preservar Individuos de Speotyto cunicularia en Lugares Disturbados). Journal of Field Ornithology, pp.99-106

¹¹⁴ Marco, I., Mentaberre, G., Ponjoan, A., Bota, G., Mañosa, S. and Lavín, S. (2006), Capture myopathy in little bustards after trapping and marking. Journal of wildlife diseases, 42(4), pp.889-891

¹¹⁵ Höfle, U., Millán, J., Gortázar, C., Buenestado, F.J., Marco, I. and Villafuerte, R. (2004), Self-injury and capture myopathy in net-captured juvenile red-legged partridge with necklace radiotags. Wildlife Society Bulletin, 32(2), pp.344-350

¹¹⁶ Department of the Environment, Water, Heritage and the Arts (2009a), Background Paper – Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*). Background Paper to the EPBCA Policy Statement 3.13 Nationally Threatened Species and Ecological Communities guidelines. Department of the Environment, Water, Heritage and the Arts, Canberra



future¹¹⁷. The northern section of the Project site contains remnant native vegetation communities comprising RE11.3.12 and RE11.3.35, both of which are known suitable habitats for the BTF, and BTF have previously (between 2012 and 2014) been observed on the fringes of these habitats. Based on the composition and arrangement of environmental characteristics of the Project site and the ecological preferences of the BTF (grassy woodlands dominated by Eucalypts, Melaleucas, or Acacias, which are nearby riparian vegetation (shelter), are surrounded by a mosaic of different habitats and in close proximity to water), the northern section of the Project site has the greatest potential to sustain a viable long-term BTF population if remediated appropriately.

The loss of habitat (remnant and non-remnant areas in the southern and central parts of the site) for the BTF will occur in stages, in accordance with the approved plan of development. In addition to the staging of works, the following management actions employed during vegetation clearing and construction activities will seek to maintain, and where possible, enhance habitats and population within important areas of habitat in the northern section of the site, and encourage the passive relocation of any BTF within the site into the retained habitat area (which includes the wildlife habitat corridor).

The actions for achieving the passive relocation are separated into two distinct components:

1. Table 3 outlines the key management measures that will be implemented during construction works within the development area to encourage the passive relocation of BTF into the retained habitat area in the northern part of the site; and
2. Table 4 outlines the management measures to be implemented within the retained habitat area to improve habitat values and support the relocation of BTF into the northern part of the site.

Further, Section 6 outlines the proposed passive relocation monitoring program.

¹¹⁷ Wild Environmental Consultants, 2017, Environmental Impact Assessment, Sanctum West - Lot 267 on EP1719 and Lot 257 on SP253223, 829 Brabon Road, Beach Holm, prepared by Wild Environmental Consultants for Maidment Land Pty

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Table 3. Mitigation and management measures to minimise impacts of development and facilitate the passive relocation of BTF.

Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
Clearing and construction works				
<p>Clearing to be staged to allow BTF to relocate</p>	<ul style="list-style-type: none"> - Staged clearing (from south to north) to occur in accordance with the Approved Plan of Development. 	<ul style="list-style-type: none"> - The staged clearing of vegetation and construction activities will commence in the southern section of the Project area, moving progressively and sequentially north to allow BTF that may utilise the central section of the site to passively disperse into the northern retained habitat area. - A suitably qualified ecologist / spotter catcher will undertake pre-clearing surveys to identify any areas of active use by BTF and other fauna species at least one month prior to the commencement of each stage of development. - Pre-clearing surveys will be guided by information gathered during ecological surveys and studies of the site, with a focus on areas and features where potential nesting activity has previously been recorded to minimise potential 	<ul style="list-style-type: none"> - Any clearing and construction activities that do not occur in accordance with the approved plan of development. 	<ul style="list-style-type: none"> - If any development activities are undertaken contrary to the approved plan of development, the Project Ecologist must be notified and corrective actions taken depending on the incident investigation outcomes.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>impacts to nesting birds, eggs, and fledglings.</p> <ul style="list-style-type: none"> - A fauna spotter catcher will be present during all clearing activities. - Clearing works will be scheduled to occur outside the breeding season of the BTF to minimise potential impacts to nesting birds, eggs, and fledglings. 		
<p>Minimise habitat loss</p>	<ul style="list-style-type: none"> - Avoid unnecessary clearing - Clearing does not occur outside of approved areas. 	<ul style="list-style-type: none"> - Prior to the commencement of construction works, all areas to be cleared will be clearly identified, with trees/areas requiring protection clearly defined and marked, including the retained habitat area in the northern section. - All vegetation clearing works will be monitored by a suitably qualified person able to identify and clearly demarcate BTF habitat. - Vehicles and machinery will only drive on existing designated access tracks or roads and these access tracks will be clearly 	<ul style="list-style-type: none"> - Any clearing outside the approved clearing footprint. 	<ul style="list-style-type: none"> - If any BTF habitat is cleared outside the defined clearing footprint, clearing is to cease immediately, and the relevant authorities will be notified. Following this, the area will be assessed, and corrective actions will be taken, with the corrective actions (e.g. revegetation works) depending on incident investigation outcomes. - Non-conformances with this requirement should be recorded

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>defined in relevant management plans (EMP etc).</p> <ul style="list-style-type: none"> - The retained habitat area in the northern section should be fenced to prevent disturbance or loss of habitat by unauthorised vehicles or machinery. - Ongoing monitoring of the extent of vegetation clearing to ensure no encroachment into unapproved areas. - Implement a pest animal management program to manage pest populations (e.g. feral pigs, wild dogs, feral cats, Indian mynah) that pose a predation threat to, or undermine habitat quality throughout the retained habitat area (i.e. drinking sites, nesting sites and key foraging habitat) or compete with the BTF for available resources (refer below). 		<p>as an incident in the Construction Contractor's incident reporting system, and actions taken will depend on investigation findings.</p> <ul style="list-style-type: none"> - Review and adapt pest animal management plan as required to achieve management goals.
<p>Minimise habitat fragmentation</p>	<ul style="list-style-type: none"> - Avoid unnecessary clearing 	<ul style="list-style-type: none"> - Prior to the commencement of construction works, all areas to be cleared will be identified and clearly marked. Clearing will 	<ul style="list-style-type: none"> - Any clearing outside the approved 	<ul style="list-style-type: none"> - If any habitat is cleared outside the defined clearing footprint or within the defined wildlife habitat corridor,

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
	<ul style="list-style-type: none"> - Clearing does not occur outside of approved clearing footprint - Maintain and enhance wildlife habitat corridors (Black River) for connectivity between important patches of remnant vegetation 	<ul style="list-style-type: none"> be monitored by a suitably qualified person, able to identify and clearly demarcate BTF habitat. - A wildlife habitat corridor is to be maintained along the Black River (and Low Creek) (with a minimum 100m buffer from the defined high bank of the Black River) to protect the existing riparian vegetation and provide connectivity for the BTF between important patches of the surrounding habitat. - The wildlife habitat corridor will be clearly marked prior to the commencement of clearing and construction works to ensure no encroachment or further loss of habitat and connectivity. - Implement a weed and pest management plan and undertake rehabilitation works within the habitat corridor to enhance habitat values within this area (see below). 	<ul style="list-style-type: none"> clearing footprint. - Degradation of habitat values within the habitat corridor 	<ul style="list-style-type: none"> clearing is to cease immediately and the relevant authorities will be notified. Following this, the area will be assessed and corrective actions (e.g. revegetation) will be undertaken, with the corrective actions depending on incident investigation outcomes. - Non-conformances with this requirement should be recorded as an incident in the Construction Contractor's incident reporting system, and actions taken will depend on investigation findings. - Regular and routine monitoring of the habitat corridor to be undertaken (refer Section 6).

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
<p>Reduce degradation of water sources for BTF</p>	<ul style="list-style-type: none"> - No contamination/ pollution of surface waters - No increase in pest animal activity in or immediately adjacent to any water sources - No increase in, or introduction of, weeds (including aquatic weeds) into any water sources within the site as a result of development. 	<ul style="list-style-type: none"> - During all site works, manage all chemicals, hydrocarbons, sewage, waste, litter etc in accordance with EMP requirements, relevant Australian Standards and any conditions of approval to protect water quality values and ensure no degradation of water sources for the BTF. - Prepare and Implement an Erosion and Sediment Control Plan (ESCP) and ensure appropriate erosion and sediment controls are installed and maintained during each stage of construction. - Prepare and implement a Stormwater Quality Management Plan and undertake monitoring of surface water at any defined discharge points and at key locations and control points in accordance with any relevant conditions of approval. - Maintain a minimum 100m buffer from the defined high bank of the Black River to protect the existing riparian vegetation and 	<ul style="list-style-type: none"> - Visual evidence of contamination with chemicals hydrocarbons etc - Litter present in waterways - Water quality at discharge points out of compliance limits. - Aquatic weeds present or increasing in abundance and 	<ul style="list-style-type: none"> - Investigate source of any contamination / exceedance of water quality parameters. - Implement remedial/corrective actions. - Notify relevant authorities if applicable. - Review and amend Stormwater Quality Management Plan and Erosion and Sediment Control Plan as appropriate. - Review Weed and Pest Management Plan and implement changes as appropriate to meet performance criteria.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>habitat corridor for BTF and other species of conservation significance.</p> <ul style="list-style-type: none"> - Prepare and implement a Weed and Pest Management Plan to minimise potential impacts to water sources from weed and pest animal incursions. 	<p>distribution in waterways.</p> <ul style="list-style-type: none"> - Visual evidence of increased pest animal activity. 	
<p>Minimise the risk of light vehicle and/or machinery strike</p>	<ul style="list-style-type: none"> - No death or injury due to light vehicle or machinery strike. 	<ul style="list-style-type: none"> - Prior to any construction and/or or vegetation clearing activities, pre-clearing surveys will be undertaken to identify any active BTF habitat areas, including any nesting sites, nests, eggs and fledglings. - Vegetation clearing will occur slowly and in a sequential pattern from south to north, to allow any BTF in the area to disperse from work areas towards the retained habitat area. - All relevant site personnel will be made aware of the previous confirmed locations of BTF activity, and receive training on the 	<ul style="list-style-type: none"> - Light vehicle or machinery strike during vegetation clearing or construction activities. 	<ul style="list-style-type: none"> - Incidents will be investigated and reported to the site Project Ecologist as soon as possible and the relevant authorities (DoEE; DEHP) notified within 24 hours. - Depending on the extent of injuries, any injured BTF will be taken to the nearest qualified veterinary practitioner or wildlife carer. - In the unlikely event of an incident causing the death of a BTF, the deceased individual will be sent to a voucher museum or handled

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>identification of the BTF. Identification posters will be installed in prominent positions at each work site / in machinery.</p> <ul style="list-style-type: none"> - Vehicles and plant will drive on pre-existing roads only, and adhere to all speed limits, which will be clearly sign posted. - Clearing and construction activities will be scheduled to occur outside of the BTF breeding season to minimise potential impacts to nests, eggs and fledglings. 		<p>in accordance with any relevant conditions of approval.</p>
<p>Minimise noise and light disturbance</p>	<ul style="list-style-type: none"> - Minimal noise and light impacts in BTF habitat areas 	<ul style="list-style-type: none"> - Ensure all plant and equipment is serviced and maintained to minimise machinery noise. - Ensure all machinery is equipped with appropriate mufflers. - Monitor noise levels throughout construction and operations and in response to any complaints from sensitive receptors. 	<ul style="list-style-type: none"> - Disturbance to BTF and other wildlife in the retained habitat area due to noise - Direct light spill >50m into BTF habitat and 	<ul style="list-style-type: none"> - Investigate source of disturbance and implement controls, where possible. - Upgrade light controlling devices or adjust the location of lighting to reduce light spill.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Where possible and practical, install light controlling devices to deflect lighting away from habitat areas. - Avoid the use of unnecessary lighting. 	<p>the retained habitat area.</p>	
<p>Reduce weeds and pest animals</p>	<ul style="list-style-type: none"> - No introduction or spread of weeds within and adjacent to development area 	<ul style="list-style-type: none"> - Develop and implement a Weed and Pest Management Plan to minimise the potential for weed introduction and spread during construction works. - Provide a weed wash-down station/s if required to prevent introduction and spread of weeds into the site (and subsequently into the retained habitat area). - Ensure all plant and equipment entering the site possess weed hygiene declaration prior to entering the property as appropriate. - Fence the retained habitat area prior to commencement of construction to prevent unauthorised vehicle access. - The EMP is to outline waste management strategies, including training of personnel 	<ul style="list-style-type: none"> - Identification of new weed species within the site - Spread of existing weeds and introduced grasses throughout the site - Increased pest (and roaming pet) activity within the site 	<ul style="list-style-type: none"> - Review Weed and Pest Management Plan and increase weed and pest animal management efforts as required to achieve performance criteria. - Review and update EMP, including waste management practices. - Monitor and enforce use of weed washdown stations. - Monitor and enforce weed hygiene declarations for all plant and equipment.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		and provision of appropriate waste receptacles to ensure no food or food scraps are left within the construction site to minimise potential occurrence of pest animals (and roaming pets) within the development area.		



Table 4. Mitigation and management measures required to improve habitat values and support BTF relocation into the northern retained habitat area.

Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
Rehabilitation works				
<p>Minimise habitat loss and protect habitat from impacts from unauthorised access such as recreational vehicles which can spread weeds, cause erosion and disturb wildlife</p>	<ul style="list-style-type: none"> - Avoid unnecessary clearing and encroachment into retained habitat area. - Establish recreational walking tracks to access Black River. - Clearing does not occur outside of approved areas. - Fencing maintained around retained habitat area. 	<ul style="list-style-type: none"> - Prior to the commencement of construction works, the retained habitat area in the northern section of the site will be clearly demarcated and fenced to prevent clearing encroachment and access by unauthorised vehicles or plant. - All vehicle access points to the retained habitat area should be gated and locked with signage installed to a restricted area. - Recreational access for bushwalkers will be restricted to a small number of access tracks. Tracks should include signage which details the importance of the area for BTF. - All vegetation clearing works within the development site will be monitored by a suitably qualified person, able to identify and clearly demarcate BTF habitat, to 	<ul style="list-style-type: none"> - Any clearing outside the approved clearing footprint. 	<ul style="list-style-type: none"> - If any BTF habitat is cleared outside the defined clearing footprint, clearing is to cease immediately and the relevant authorities will be notified. Following this, the area will be assessed and corrective actions (e.g. revegetation) will be taken, with the corrective actions depending on incident investigation outcomes. - Non-conformances with this requirement should be recorded as an incident in the Construction Contractor's incident reporting system, and actions taken will depend on investigation findings. - Review and adapt Weed and Pest Management Plan as required to achieve management goals.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>ensure no encroachment into the retained habitat area.</p> <ul style="list-style-type: none"> - Vehicles and machinery will only drive on existing designated access tracks or roads and these access tracks will be clearly defined in relevant management plans (EMP etc). - Development and implement a Weed and Pest Management plan to manage weed and pest populations (e.g. feral pigs, wild dogs, feral cats, Indian mynah) that pose a predation threat to, or undermine habitat quality throughout the retained habitat area (i.e. drinking sites, nesting sites and key foraging habitat) or compete with the BTF for available resources (see below). 		
<p>Minimise habitat fragmentation</p>	<ul style="list-style-type: none"> - Avoid unnecessary clearing - Clearing does not occur outside of approved areas 	<ul style="list-style-type: none"> - Prior to the commencement of construction works, the retained habitat area will be identified and clearly marked. Clearing will be monitored by a suitably qualified person, able to identify and clearly 	<ul style="list-style-type: none"> - Any clearing within the retained habitat area. 	<ul style="list-style-type: none"> - If any habitat is cleared within the defined wildlife habitat corridor or retained habitat area, clearing is to cease immediately and the relevant authorities will be notified. Following this, the area will be

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
	<ul style="list-style-type: none"> - Maintain wildlife habitat corridors for connectivity - Enhance habitat values within the retained habitat area 	<ul style="list-style-type: none"> demarcate BTF habitat in accordance with the approved plan of development. - A wildlife habitat corridor will be maintained along the Black River (and Low Creek) (with a minimum 100m buffer from the defined high bank of the Black River) to protect the existing riparian vegetation and maintain connectivity for the BTF between important patches of the surrounding habitat. - A Weed and Pest Management Plan will be developed and implemented to assist in the maintenance of this important landscape feature. 		<ul style="list-style-type: none"> assessed and corrective actions (e.g. revegetation) will be taken, with the corrective actions depending on incident investigation outcomes. - Non-conformances with this requirement should be recorded as an incident in the Construction Contractor's incident reporting system, and actions taken will depend on investigation findings.
<p>Minimise changes in hydrology resulting in loss of permanent water sources for BTF</p>	<ul style="list-style-type: none"> - No loss of surface water resources in important (retained) habitat area in northern section of site 	<ul style="list-style-type: none"> - Visually monitor surface water resources in the retained habitat area in the northern section of the site (refer Section 6 – Monitoring). - Where a loss of surface water resource is unavoidable, provide additional raised 	<ul style="list-style-type: none"> - Permanent loss of surface water resources in the retained habitat area without a 	<ul style="list-style-type: none"> - Implement remedial actions to provide suitable supplementary water sources in suitable locations, where possible.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>drinking troughs in strategic locations that meet the following location criteria:</p> <ul style="list-style-type: none"> - Within 400m of suitable nesting habitat trees. - Where grass species that provide forage (grass seeds) throughout the year are present, particularly in the wet season (typically early flowering perennials). Some grass species that are considered important forage species for Black-throated Finch include <i>Urochloa mosambicensis</i>, <i>Enteropogon acicularis</i>, <i>Panicum decompositum</i>, <i>Panicum effusum</i>, <i>Dichanthium sericeum</i>, <i>Alloteropsis semialata</i>, <i>Eragrostis sororia</i> and <i>Themeda triandra</i> (DEWHA, 2009a). - BTF will drink from artificial water sources as long as suitable perches are available (NRA 2011). If artificial water sources are provided, ensure perches 	<p>replacement water source provided.</p>	<ul style="list-style-type: none"> - Monitor BTF use of new water sources as part of the MDPRP monitoring program.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>are also installed to allow drinking access.</p>		
<p>Reduce weeds and introduced grass competition</p>	<ul style="list-style-type: none"> - Reduce extent and distribution of weeds and introduced grasses within the retained habitat area - Reduce extent and distribution and weeds and introduced grasses within the wildlife habitat corridor - Prevent exotic pasture species from becoming dominant - No new weed species located 	<ul style="list-style-type: none"> - Develop and implement a Weed and Pest Management Plan which is designed to achieve and focuses on: <ul style="list-style-type: none"> - Intensive weed control in the first 3 years to increase likelihood of remediation of the retained habitat area. - Identification of existing weeds and introduced grass species within the retained habitat area and development of a species inventory, including prioritisation of target species for management actions (e.g. any restricted species listed under the <i>Biosecurity Act 2014</i> such as Lantana and Rubber vine, and other locally significant species such as Snakeweed, which currently dominates the groundcover throughout much of the retained habitat area, 	<ul style="list-style-type: none"> - Identification of new weed species within retained habitat area - Spread of existing weeds and introduced grasses throughout retained habitat area. 	<ul style="list-style-type: none"> - Review weed management strategies and increase weed management efforts as required to achieve performance criteria. - Implement a monitoring program (as outlined in Section 6 of this MDPRP, and in the Weed and Pest Management Plan and any other relevant management plans), to monitor the success (or otherwise) of weed management works and identify areas for improvement / additional management efforts. - Work in conjunction with neighbouring landowners, where relevant, to manage infestations and prevent the introduction of

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
	<p>within retained habitat area</p> <ul style="list-style-type: none"> - Identification and control of new weeds 	<p>outcompeting native palatable grass species.</p> <ul style="list-style-type: none"> - Mapping the extent and distribution of weeds and introduced grasses throughout the retained habitat area. - Determination of a suitable management program to ensure successful and long-term management outcomes are satisfied, including consideration of physical (mechanical), chemical, biological, and cultural management options if applicable. Details of any herbicides to be used, their method, rate and timing of application and herbicide labels (and/or (Material) Safety Data Sheets) will be included. - The application of herbicides will be undertaken by suitably qualified professionals in accordance with any relevant licences and permits. 		<p>new weed species from surrounding areas.</p>

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Avoid the introduction and spread of any new weed species. - Outlining a weed management implementation schedule based on species biology and local conditions, including an outline of the specific type and timing of treatment to be adopted for each target species. It will outline herbicide use procedures and protocols and provide datasheets for reporting purposes. - The Weed and Pest Management Plan will outline requirements for any wash-down station/s if required to prevent spread of weeds into the retained habitat area. A washdown register will be provided as an appendix to the Weed and Pest Management Plan. - Outlining ongoing monitoring requirements to monitor progress and achievement of the performance criteria. 		

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Where appropriate, individual species management plans may be developed for 'priority species' as part of the overarching Weed and Pest Management Plan. - In addition, the retained habitat area should be fenced to prevent unauthorised vehicle access, and the fence should be inspected on a regular basis to ensure its integrity. - A Landscape Plan should be prepared for the whole of the development, specifying the use of native vegetation in revegetation and landscaping works (including a list a recommended / approved species for use). - Consider using hydromulch seed mix, comprising a range of native BTF forage grass species, to stabilise open areas such as road side table drains etc. This will provide additional seed source for BTF in the area and prevent the establishment of weeds and other introduced species in 		

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>disturbed areas throughout the development site.</p> <ul style="list-style-type: none"> - Consider engaging adjacent landholders in a collaborative weed management program to minimise the risk of weed spread from neighbouring properties and to enhance habitat values across the broader landscape. - Consider engaging with local environmental / community groups in a collaborative manner to assist management of the retained habitat area, and to seek expert local knowledge and advice in relation to the BTF (e.g. Black-throated Finch Recovery Team; Coastal Dry Tropics Landcare Inc.) - A site-specific Grazing Management Plan should be developed by a suitably qualified person, identifying appropriate grazing practices, including stocking rates, and spelling periods, to assist in the reduction 		

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<p>of non-palatable introduced grasses throughout the retained habitat area.</p>		
<p>Increase availability of palatable seed for the BTF</p>	<ul style="list-style-type: none"> - Achieve >50% groundcover throughout retained habitat area at end of dry season¹ - Increase seed availability throughout retained habitat area during early wet season - Achieve >25% ground cover of early flowering perennial grasses during the wet season. 	<ul style="list-style-type: none"> - Develop and implement a site-specific grazing management plan that allows for: <ul style="list-style-type: none"> - light grazing during the dry season to achieve >50% groundcover late in the dry season². Light grazing will assist in managing the extent, distribution, and density of introduced pasture grasses throughout the retained habitat area during the dry season. - Up to 12 weeks of spelling within the retained habitat area at the onset of the wet season to minimise defoliation and to promote the maintenance of palatable, perennial, and productive native grasses during the recognised BTF ‘food bottleneck’ period (NRA 2011). 	<ul style="list-style-type: none"> - <50% groundcover at end of dry season - Reduced seed availability in early wet season - Extensive and uncontrolled fires do not occur 	<ul style="list-style-type: none"> - Review and adjust grazing practices to achieve >50% groundcover at the end of the dry season. - Review and adjust spelling period to achieve promotion of maintenance of palatable, perennial, and productive native grasses to provide seed for BTF through the wet season. - Review and adjust fire management practices as required. - Undertake additional revegetation works if required to achieve performance criteria.

¹ Management advice adopted from the Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt North Bioregion (NRA 2011).

² Management measure obtained from the Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt North Bioregion (NRA 2011).

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - The Grazing Management Plan is to be prepared by a suitably qualified person with expertise in grazing management in the north Queensland dry tropics, and specifically management within BTF habitat areas. - Fence the retained habitat area to enable effective exclusion of cattle during the spelling period. - Implement fire management practices to maintain existing fire regimes that promote generation of suitable foraging habitat for the BTF and employ appropriate fire regimes in retained habitat area to enhance generation of suitable habitat. This will include: <ul style="list-style-type: none"> - Utilisation of mosaic burning regimes to stage and locate burning in order to avoid sudden and widespread loss of food resources. 		

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Timing of controlled burning to avoid breeding and nesting periods. - It is noted that fire as a management tool may not be an appropriate mechanism following completion of the development, due to the proximity of houses to the retained habitat area. As such, firebreaks and fire fighting access tracks etc should be considered at this preliminary stage and incorporated into the planning and management of the retained habitat area. - Undertake revegetation works if required to achieve performance criteria. 		
<p>Improve areas of potential BTF breeding habitat</p>	<ul style="list-style-type: none"> - Increase number of potential roosting and nesting trees throughout retained habitat area 	<ul style="list-style-type: none"> - Undertake weed management works in accordance with the Weed and Pest Management Plan to reduce competition for resources and encourage natural recruitment of native canopy trees (and shrub layer species) throughout the retained habitat area. 		

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Where any areas in the retained habitat area do not meet 'remnant status' following detailed vegetation assessments (Section 6) consider implementing an assisted revegetation program to increase the number and diversity of native species (using species representative of the on ground Regional Ecosystem). 		
<p>Reduce pest animal (and roaming pet) predation, habitat damage and competition</p>	<ul style="list-style-type: none"> - Reduce extent of pest animal habitat disturbance throughout retained habitat area - Pig damage evident in <5% of 20 randomly selected 1m x 1m quadrats in the retained habitat area¹. 	<ul style="list-style-type: none"> - Prepare and implement a Weed and Pest Management Plan which focuses on: <ul style="list-style-type: none"> - Identification and management of pest animals within the site, including priority target species such as feral pigs, which cause significant damage to BTF habitat areas. - Ground-truthing (and mapping) the extent of pest animal damage and disturbance prior to the commencement of rehabilitation works. 	<ul style="list-style-type: none"> - New areas of pest animal disturbance and damage evident. - Pig damage evident in >5% of 20 randomly selected 1m x 1m quadrats. 	<ul style="list-style-type: none"> - Review and adapt pest animal management strategies to mitigate impacts and to achieve performance criteria. - Undertake additional pest animal management works if and as necessary. - Continue to monitor the retained habitat area for pest animal disturbance and damage.

¹ Adapted from the Habitat Management Guidelines for the Black-throated Finch (*Poephila cincta cincta*) in the Brigalow Belt North Bioregion (NRA 2011).

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Developing site-specific management strategies, including trapping programs etc, to reduce pest animal abundance and disturbance throughout the site. - Management of pest animals through control strategies such as shooting, baiting, and trapping. - Outlining an implementation schedule, for pest animal management works. <p>Control of pest animals will be conducted using a mix of the following methods:</p> <ul style="list-style-type: none"> • Killing/removal (e.g. trapping, baiting); and • Exclusion (e.g. fencing) <ul style="list-style-type: none"> - Pest animal management programs are to be developed in conjunction with relevant local or state authorities and are to be undertaken by a suitably qualified and experienced contractor in accordance with relevant legislation, guidelines, permits and licences. 	<ul style="list-style-type: none"> - Confirmed death of any individual BTF through direct observation or scat analysis. - No waste (food or food scraps) left onsite during construction works. 	<ul style="list-style-type: none"> - Regular inspections of fences to ensure no breach of fencing around the retained habitat area.

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Goal (Impact)	Performance Criteria	Management Measures	Trigger	Corrective Action
		<ul style="list-style-type: none"> - Implement a pest animal monitoring program to determine the success of the program in achieving performance criteria and inform any changes that should be implemented. This may include monitoring through visual inspections, through assessment of habitat condition during scheduled monitoring events, through photo monitoring and / or the use of sand plots and other recognised monitoring techniques. - Consider engaging with adjacent landholders in a collaborative pest animal management program. - No waste (food or food scraps) is to be left onsite during construction works as the presence of a food source may encourage pest animals (and roaming pets) into the site. Waste management strategies will be outlined in the Project EMP. 		



5.3.1 Weed control

Initial weed species which have been identified in the retained habitat area are listed below and their importance/ priority level for management is recommended, along with an outline of the appropriate control methods. General objectives of weed control measures will be:

- Control of all invasive infestations by recommended methods. All weed material that is manually removed should be disposed of at an appropriate location/waste facility, buried or burned to prevent regeneration from vegetative material;
- Conservation grazing management to suppress environmental and pasture weeds through the Grazing Management Plan;
- Maintenance of ground cover in grazed areas to prevent new infestations. Grazing to be selectively removed to facilitate maximum native ground cover;
- Spot spraying infestations of environmental weeds using a selective herbicide prior to flowering, herbicide use to be undertaken by a licenced operator and in accordance with the recommended methods for the species and the herbicide in use;
- Spot spraying of environmental weeds as part of annual works program with a minimum five (5) years consecutive control of persistent infestations to reduce seed bank; and
- Follow up work will be required for all species to control new weed growth.

Further detailed management strategies will be provided in accordance with the Weed and Pest management Plan.

5.3.2 Weed categorisation

Weeds have been rated as low, medium, or high priority using the following classification matrix. The matrix considers the potential environmental impact of the weed and the control or legislative status of the weed. The priority ratings are proposed to help priorities management actions and resources.

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Table 5. Weed priority classification matrix (Source: adapted from Ecosure 2014, *Weed Action Management Plan (2014 - 2019) Shoalwater Bay Training Area*, report prepared for Spotless Services, Ecosure).

		Potential impact on the environment		
		Insignificant or Minor	Moderate	Major
Status	Declared class 1 or WONS	Medium	High	High
	Declared class 2 or 3	Medium	Medium	High
	Environmental Weed or local law	Low	Low	Medium

Table 6 outlines the weed management actions for the priority weeds already identified on site.

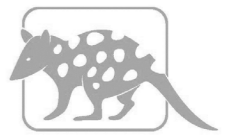
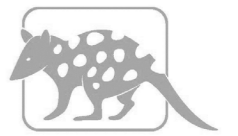


Table 6. Weed management actions.

Weed	Legislative status	Priority	Control measures
<i>Ziziphus mauritiana</i> - Chinee apple	Class 2, restricted invasive plant, environmental weed	High	<p>Mechanical Removal</p> <p>Where possible mechanical removal will be used to eradicate weeds. All cleared material will be disposed on the day it is cleared, either by being stacked and burnt or by being transferred to a rubbish tip.</p> <p>Remaining broken and exposed stems should be treated by basal bark spraying.</p> <p>Herbicide Control</p> <p>Remaining Chinee apple weeds on the property are to be controlled by the cut stump method or basal bark spraying for stems up to 15cm in diameter.</p> <p>Cut stump</p> <p>One individual will cut the Chinee apple tree (e.g. chainsaw, axe) at a maximum height of 15 cm. Another individual will immediately apply Fluroxypyr 200 g/L at 3L/ 100L of diesel¹²¹. Cut stump control will occur on a quarterly basis for life of the project.</p> <p>Basal bark spray</p> <p>For stems up to 15 cm in diameter, carefully spray completely around the base of the plant to a height of 40 cm above ground level. It is important to thoroughly spray into the crevices of multi-stemmed plants.</p>
<i>Cryptostegia grandiflora</i> - Rubber Vine	Class 2, Weed of National Significance, restricted invasive plant	High	<p>Mechanical Removal</p> <p>Scattered and medium density infestations will be repeatedly slashed or cut close to the ground.</p> <p>Herbicide Control</p> <p>Remaining rubber vine infestations on the property are to be controlled by the cut stump, or basal bark spray methods.</p> <p>Cut stump</p> <p>One individual will cut the rubber vine (e.g. chainsaw, axe) at a maximum height of 15 cm. Another individual will immediately apply Triclopyr 240 g/L + Picloram 120 g/L at 1L/60 L Diesel¹²². The Cut Stump treatment is considered a robust and cost-effective method for scattered to medium density Rubber Vine infestations. Cut Stump control will occur on a quarterly basis for life of the project.</p> <p>Basal bark spray</p> <p>Thoroughly spray around the base of the plant to a height of 20-100 cm above ground level, spraying higher on larger plants.</p>
<i>Lantana camara</i> - Lantana	Class 3, restricted invasive plant, Weed of National Significance, environmental weed	High	<p>Mechanical Removal</p> <p>Where possible mechanical removal will be used to eradicate weeds. All cleared material will be disposed on the day it is cleared, either by being stacked and burnt or by being transferred to a rubbish tip.</p>

¹²¹ Department of Agriculture and Fisheries Biosecurity Queensland. (2016). *Chinee apple Indian jujube Ziziphus mauritiana*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0008/52766/IPA-Chinee-Apple-PP26.pdf. Last accessed 22/08/2017.

¹²² Department of Agriculture and Fisheries - Biosecurity Queensland. (2017). *Rubber vine Cryptostegia grandiflora and Cryptostegia madagascarensis*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0020/52544/IPA-Rubber-Vine-PP11.pdf. Last accessed 28/08/2017.



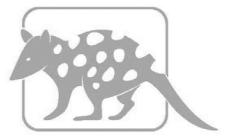
			<p>Manual control</p> <p>For remaining small infestations, manual methods such as grubbing and slashing can be useful and effective control techniques.</p> <p>Herbicide Control</p> <p>Remaining Lantana infestations will undergo foliar spray treatments between October and April. Fluroxypyr 200 g/L will be applied at 500ml to 1l/100l water¹²³. Weed will require complete inundation in chemical for it to be effective. Foliar spraying will occur twice a year for life of the project.</p>
<i>Hymenachne amplexicaulis</i> - Hymenachne	Class 2, Weed of National Significance, restricted invasive plant	High	<p>Mechanical Removal</p> <p>Initial removal and control of large infestations will be through mechanical control, using earthmoving equipment to remove the plants. Grazing control will also be used during the dry season.</p> <p>Herbicide Control</p> <p>Remaining Hymenachne infestations may be controlled via direct herbicide spray treatments. Although no herbicides are currently registered for control of Hymenachne, the Department of Agriculture and Fisheries suggest two herbicides. Glyphosate 360 g/L at 14L/ha should be applied via a knapsack device¹²⁴. Herbicide treatment will occur on a quarterly basis for life of the project. Avoid spraying an entire heavy infestation, as it can cause biological hazards from large quantities of rotting vegetation. Hymenachne infestations should be sprayed in strips to avoid this issue.</p>
<i>Stachytarpheta jamaicensis</i> – Snake weed	Environmental weed	Medium	<p>Manual Control</p> <p>Snake weed infestation will be seasonally controlled using slashing before it reaches seed set; or</p> <p>Herbicide Control</p> <p>Snakeweed infestations will undergo foliar spray treatments during the summer months (most susceptible). 2,4 D amine at 2.21/ha is the prescribed herbicide and application rate for Snakeweed species¹²⁵. Foliar spraying will occur once a year during summer for life of the project.</p>
<i>Sida cordifolia</i> - Flannel weed	Environmental weed	Medium	<p>Manual Removal</p> <p>Infestations will be controlled via slashing. Slashing will occur opportunistically for life of the project.</p> <p>Herbicide Control</p> <p>Remaining Flannel weed infestations will undergo foliar spray treatment. 2,4 D amine is a prescribed herbicide rate for Flannel weeds¹²⁶. Foliar spraying will occur once a year for life of the project.</p>

¹²³ Department of Agriculture and Fisheries - Biosecurity Queensland. (2016). *Lantana Lantana camara Lantana camara*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0009/62010/IPA-Lantana-PP34.pdf. Last accessed 23/08/2017.

¹²⁴ https://www.daf.qld.gov.au/__data/assets/pdf_file/0007/77092/IPA-Hymenachne-PP54.pdf

¹²⁵ Department of Agriculture and Fisheries Biosecurity Queensland. (2016). *Snakeweed Stachytarpheta spp.*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0005/54392/IPA-Snakeweed-PP52.pdf. Last accessed 23/08/2017

¹²⁶ Department of Primary Industries and Regional Development. (2016). *Sida control*. Available: <https://www.agric.wa.gov.au/herbicides/sida-control>. Last accessed 23/08/2017.



<p><i>Melinis repens</i> – Red natal grass</p>	<p>Environmental weed</p>	<p>Medium</p>	<p>Mechanical Removal Infestations will be controlled via slashing. Slashing will occur opportunistically for life of the project. Grazing may also be an appropriate control.</p> <p>Herbicide Control Remaining Red natal grass infestations will be opportunistically controlled by foliar spray treatments for life of the project. A Glyphosate herbicide (360g/L glyphosate at 1.5L per ha) will be used, as it is a generic herbicide.</p>
<p>Megathyrsus maximus - Guinea grass</p>	<p>Environmental weed</p>	<p>Medium</p>	<p>Manual Removal Infestations will be controlled via slashing. Slashing will occur opportunistically for life of the project. Grazing may also be an appropriate control.</p> <p>Herbicide Control Remaining guinea grass infestations will be opportunistically controlled via foliar spray treatments for life of the project. . A Glyphosate herbicide (360g/L glyphosate at 9L per ha) will be used. This herbicide is recommended for Guinea grass¹²⁷.</p>
<p><i>Urochloa mutica</i> - Para grass</p>	<p>Not declared, environmental weeds</p>	<p>Medium</p>	<p>Mechanical Removal Infestations will be controlled via slashing. Slashing will occur opportunistically for life of the project. Grazing may also be an appropriate control.</p> <p>Herbicide Control Remaining Para grass weeds will undergo foliar application (knapsack) treatments. A Glyphosate herbicide (360g/L glyphosate at 200ml per 15L water) will be used. This herbicide is recommended for Para grass weeds and is able to target other problem weeds¹²⁸. Foliar spraying for Para grass will occur opportunistically for life of the project.</p>
<p><i>Stylosanthes scabra</i> - Shrubby stylo</p>	<p>Environmental weed</p>	<p>Medium</p>	<p>Mechanical Removal Infestations will be controlled via slashing. Slashing will occur opportunistically for life of the project. Grazing may also be an appropriate control.</p>
<p><i>Crotalaria goreensis</i> - Gambia Pea</p>	<p>Not classified</p>	<p>Low</p>	<p>Mechanical Removal Where possible mechanical removal will be used to eradicate weeds. All cleared material will be disposed on the day it is cleared, either by being stacked and burnt or by being transferred to a rubbish tip.</p> <p>Manual Removal Where possible, individuals will manually remove Gambia pea weeds via hand pulling.</p>

¹²⁷ Department of Agriculture and Fisheries Biosecurity Queensland. (2016). *Guinea grass Megathyrsus maximus var maximus*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0006/67398/IPA-Guinea-Grass-PP82.pdf. Last accessed 23/08/2017.

¹²⁸ Department of Agriculture and Fisheries - Biosecurity Queensland. (2016). *Para grass Urochloa mutica*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0015/55302/IPA-Para-Grass-PP90.pdf. Last accessed 28/08/2017.



<p><i>Themeda quadrivalvis</i> – Grader grass</p>	<p>Not classified</p>	<p>Low</p>	<p>Manual Removal Infestations will be controlled via slashing. Slashing will occur opportunistically for life of the project. Grazing may also be an appropriate control.</p>
<p><i>Passiflora foetida</i> - Stinking passion flower</p>	<p>Environmental weed</p>	<p>Low</p>	<p>Manual Removal Hand pulling vines opportunistically will be the most effective control measure.</p> <p>Herbicide Control Remaining stinking passion flower weeds on the property are to be controlled by the cut stump method. It is recommended that the weed is cut at the base and a Glyphosate herbicide (360g/L glyphosate at 1 part product to two parts water) is applied¹²⁹. Cut stump control will occur on a quarterly basis for life of the project.</p>

¹²⁹ Department of Agriculture and Fisheries Biosecurity Queensland. (2016). *Stinking passion flower Passiflora foetida*. Available: https://www.daf.qld.gov.au/__data/assets/pdf_file/0017/55322/IPA-Stinking-Passion-Flower-PP95.pdf. Last accessed 23/08/2017.



6. Relocation monitoring program

Regular monitoring will be integral in determining the success of this MDRP. First and foremost, it will be critical to confirm and understand the present day use of the whole of the site by the BTF prior to any site disturbance, vegetation clearing, construction activities or rehabilitation works. Secondly, habitats in the northern section will be monitored before and after the implementation of rehabilitation works and any other relevant management actions. Monitoring will commence upon approval and implementation of this MDRP.

Baseline monitoring will commence in the northern section and any other areas where BTF are confirmed to occur prior to the commencement of works. Baseline monitoring will include biannual seasonal BTF surveys (breeding season March to May and late dry season), vegetation surveys and BioCondition assessments as described below ensuring a maximum currency of two (2) years pre commencement of works. The monitoring program will continue on an annual basis post commencement of works and for a period of five (5) years post completion of works and include biannual (seasonal) BTF surveys and annual late wet season BiCondition assessments.

In addition, prior to each stage of works, pre-clearance surveys will be undertaken to identify suitable habitat areas and areas of occurrence of BTF, with a particular focus on any nesting and foraging sites.

The monitoring program forms part of an adaptive management strategy that will allow for the review and improvement of the program to ensure the performance indicators and management goals are being satisfied.

The purpose of the monitoring program is to provide a methodology for systematic and repeatable surveys to inform:

- BTF population numbers, location, and activity/behaviour within the site prior to disturbance;
- The effectiveness / success of the management actions in achieving the desired outcomes for the retained habitat area in the northern section of the site, including:
 - reduction in the extent, distribution and density of weeds and introduced pasture grasses;
 - reduction in the extent of habitat disturbance/loss as a result of pest animal activity;
 - >50% groundcover at the end of the dry season, including >25% early flowering perennial native grasses (such as Cockatoo Grass);
 - increased availability and diversity of palatable seeds during the early wet season ('food bottleneck') period. At least six (6) different grass species should be available at any time, of which at least four (4) should be native; and



- utilisation of the retained habitat area by BTF, including for foraging, nesting and drinking from new or existing water sources.

Survey methods for BTF will be as per the Significant Impacts Guidelines and include a combination of:

- water body counts;
- standardised bird surveys; and
- rapid habitat assessments (modified Queensland Herbarium and BioCondition methods).

Survey methods to determine the success of management actions within the retained habitat area will be as per the BioCondition Assessment Manual¹³⁰ and the Methodology for Survey and mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 3.2¹³¹.

All monitoring will be undertaken by suitably qualified and experienced ecologists to ensure that the milestone performance indicators have been met.

¹³⁰ Eyre, T.J., Kelly, A.L., Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2015), BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane

¹³¹ Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012), Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.2. Updated August 2012. Queensland Herbarium, Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane. 124 pp

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Table 7. Details of MDPRP monitoring program for the BTF.

Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
<p>Identify BTF population/s within the project site</p>	<p>Undertake biannual seasonal BTF surveys (breeding season - March to May; and late dry season) <u>prior to the commencement of site works</u>, ensuring a maximum currency of two (2) years, to confirm the occurrence of BTF within the Project site and to understand the present day population numbers, locations, favoured habitat areas and behaviours within the site.</p> <p>Undertake seasonal BTF surveys (between March and May; and late in the dry season) on an annual basis <u>post commencement of works</u> and for a period of five (5) years <u>post completion of construction and rehabilitation works</u> to determine BTF use of the retained habitat area and success of the MDPRP in achieving its goals and objectives.</p> <p>BTF surveys will be conducted in accordance with the Significant Impact guidelines (BTF), including as a minimum:</p>	<p>N/A</p>	<p>Record and map BTF locations within the Project site.</p> <p>Record BTF population numbers and include all relevant details, including behavioural activities within the site.</p> <p>Assess present-day use of the site</p>

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	<p>Targeted searches - one hour/ha with maximum of 10 hours per search area (that is 600 m radius of water source)</p> <p>Water source observations - Minimum of six (6) hours a day for two (2) days for each water source (that is, 12 hours/water source).</p> <p>Undertake pre-clearance surveys for BTF at least one month prior to planned vegetation clearing, targeting all suitable habitats for this species within the Project area, including areas to be cleared. (outlined below).</p>		
<p>Quantify habitat values of development area prior to site works</p>	<p>Using the BioCondition Assessment Methodology (outlined below), undertake assessment of the development footprint to quantify BTF habitat values that will be lost as a result of the development and for comparison with retained habitat area.</p>	<p>N/A</p>	<p>Record and map habitat values within the development area.</p>
<p>Rehabilitation of retained habitat area in the northern part of the site prior to and post commencement of works</p>	<p>Undertake detailed vegetation surveys, in accordance with the 'Methodology for the Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland' (Neldner et al 2012) within the</p>	<p>N/A</p>	<p>Prepare an assessment of each vegetation community against the RE benchmark data to inform site-specific management objectives and targets.</p>

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	<p>retained habitat area to accurately map vegetation communities and inform the location of suitable BioCondition monitoring sites.</p> <p>Determine suitable monitoring sites for ongoing and long-term monitoring of habitat conditions within the retained vegetation area. The methodology outlined within the BioCondition Assessment Manual is to be employed to provide a standardised and repeatable methodology for monitoring of the site.</p> <p>Employing the BioCondition Assessment Methodology (outlined below) and photo monitoring, undertake baseline assessments to determine ecological condition of the retained habitat area in the northern section of the site prior to commencement of works ensuring a maximum currency of two (2) years. Where available, regional ecosystem benchmark data will be obtained for each RE to inform specific rehabilitation objectives.</p>		<p>Establish and mark permanent monitoring plots within retained habitat area.</p> <p>Record and map habitat values and features as per BioCondition Assessment methodology.</p> <p>Undertake monitoring in accordance with relevant management plans, including Weed and Pest Management Plan.</p> <p>Where new infestations of weeds and/or pests are observed or any significant changes are observed during monitoring, additional management efforts may be necessary and more frequent monitoring implemented as appropriate.</p>

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	<p>Implementation of an annual rehabilitation monitoring program post commencement of works and for a period of 5 years post completion of construction and rehabilitation works. The monitoring program will include BioCondition Assessments of the established permanent monitoring plots to gauge success (or otherwise) of the MDPRP in achieving the stated performance criteria, as follows:</p> <p>BioCondition Assessments as per the BioCondition Assessment Manual (Eyre et al 2015) and photo monitoring will be undertaken annually to determine the ongoing condition of the site and success of the management actions outlined in Section 5 of this MDPRP and any other relevant management plans for the site. A minimum of five (5) permanent monitoring plots will be established throughout the retained vegetation (rehabilitation) area, and if possible, a minimum of two (2) additional permanent monitoring plots should also be</p>		

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	<p>located in similar habitat between 1 km and 2 km from the Project Area (as control sites). Each permanent survey site will comprise a 100 m x 50 m plot within which the number and species of large trees will be recorded, in addition to tree canopy height, recruitment of canopy species and native tree species richness.</p> <p>A 100 m transect will be established down the centre line of the 100 m x 50 m plots, and assessment of tree canopy cover and native shrub cover will be undertaken.</p> <p>A 50 m x 10 m sub-plot, centred on the 25 m point to the 75 m point along the transect, and encompassing 10 m either side of the transect is to be assessed for coarse woody debris.</p> <p>Five 1 m x 1 m quadrats, starting at the 35 m point and located on alternate sides of the centre-line, 10 m apart along the 100 m transect are to be established and assessed for native grass cover and organic litter (an</p>		

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	<p>average value is derived over the five quadrats).</p> <p>In addition to the five (5) permanent quadrats, 20 1 m x 1 m quadrats will be randomly selected for assessment of pig damage.</p> <p>Photographs, stamped with date, time, GPS coordinates and details of the direction in which the photo was obtained, will be taken each time a BioCondition assessment is undertaken. Spot photos of the 1m x 1m quadrats should also be taken to document change in ground cover over time.</p> <p>Permanent photo monitoring points will also be established to provide a landscape or series of landscape photos, which will record the tree and shrub layers, and significant changes and the general condition of the site over time. At the centre point of the 100 m transect, four photos should be taken looking north, south, east and west of the 50 m plot centre.</p>		

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	<p>A typical BioCondition Plot configuration is shown in Figure 3.</p> <p>Sand plots may be established at key sites to determine pest animal activity throughout the retained vegetation area (which includes the wildlife habitat corridor), in accordance with the Weed and Pest Management Plan.</p> <p>Weed infestations will be monitored through the BioCondition Assessments and in accordance with the Weed and Pest Management Plan.</p> <p>All stakeholders will be required to report sightings of pest animal species. Sightings will include:</p> <ul style="list-style-type: none"> - direct confirmed observations; - tracks and scats; and - indicative habitat disturbance. 		
<p>No vegetation clearing outside of approved clearing area</p>	<p>Ongoing monitoring of clearing footprint compliance by Project Ecologist during each stage of clearing and development.</p>	<p>Any clearing outside approved clearing area.</p>	<p>Ensure compliance with any relevant conditions of approval.</p>

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Performance criteria	Monitoring program	Trigger for corrective action	Outcomes
	Regular inspections of fences around the retained vegetation area to ensure no breach of fencing and no encroachment of clearing or other disturbance into the retained habitat area.		Record any non-compliance and report to relevant authorities as required. Rehabilitate areas outside of approved clearing footprint.
No loss of surface water resources in the retained habitat area	Develop and implement a program to monitor water levels and condition of habitat at waterways and water sources within the retained habitat area.	Permanent loss of surface water resources in retained habitat area within the Project Area.	Installation of supplementary water supplies to replace any surface water resources that are lost or degraded, in accordance with management actions outlined above.
No pollution or contamination of water sources (eg. sediment, fuels, chemicals)	Implement a water quality monitoring program in accordance with the Stormwater Quality Management Plan and any relevant conditions of approval, to monitor potential impacts to water resources in and adjacent to the retained habitat area. Implement and monitor any erosion and sediment controls, in accordance with the Erosion and Sediment Control Plan, to protect water quality values of the downstream environment and important water sources for the BTF.	Exceedance of any relevant conditions of approval.	Baseline water quality for comparison during monitoring.

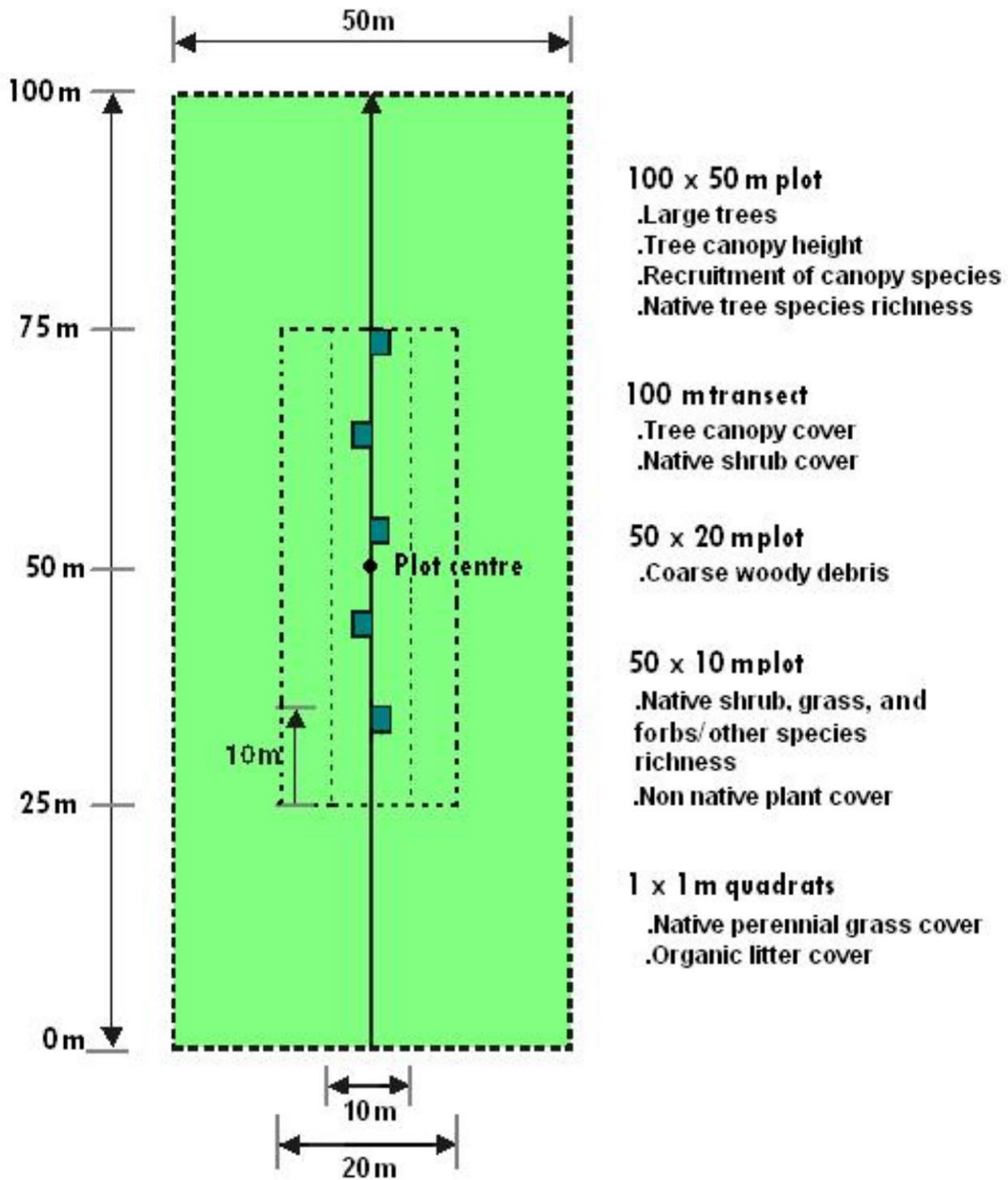


Figure 4. BioCondition Assessment Plot Configuration (Source: BioCondition Assessment Manual, Eyre et al 2015).



7. Timing and implementation

This section outlines the proposed implementation schedule for the proposed management and monitoring measures. The frequency and timing of the management measures differs between values affected.

It is expected that the management measures and the successful restoration of the remaining habitat will take approximately five (5) years to complete. Management and monitoring activities will continue for a minimum of five (5) years post completion of the construction and rehabilitation works or until either the following outcomes are met:

- No BTF detected within the project site for three (3) consecutive years; or
- All of the performance criteria are met.

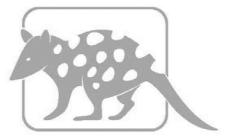
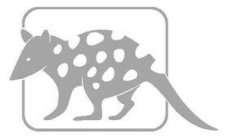


Table 8. Implementation schedule.

Management or monitoring component	Activity	Description	Timing	Frequency (or until performance outcome reached)
Weed management	Prepare Weed and Pest Management Plan	Develop and implement a Weed and Pest Management Plan to minimise the potential for weed introduction and spread during construction works.	Upon acceptance of MDPRP and project approval and prior to construction	N/A
	Conduct weed surveys	Identify existing weeds and introduced grasses	Upon acceptance of MDPRP and project approval and prior to construction	Once only
		Map the extent and distribution of weeds	Upon acceptance of MDPRP and project approval and prior to construction	Once only
	Weed control	Conduct weed control management in accordance with the plan	Upon acceptance of MDPRP and project approval	Quarterly for 1 st 12 months Annually for five (5) years post commencement of construction
	Grazing management	Prepare and implement grazing management plan	Upon acceptance of MDPRP and project approval	In perpetuity
	Implement fire management practices	Implement fire management practices to maintain existing fire regimes that promote generation of suitable foraging habitat for the BTF and employ appropriate fire regimes in retained habitat area to enhance generation of suitable habitat.	Following an assessment of weed survey results (in the appropriate season)	TBA
Habitat protection	Fencing	Demarcate area to be retained	Prior to commencement of construction	N/A
		Fence the retained habitat area	Prior to commencement of construction	N/A
		All vehicle access points to the retained habitat area to be gated and locked	Prior to commencement of construction	N/A
	Signage	Erect signage to educate recreational users	Prior to commencement of construction	N/A
	Revegetation	Conduct revegetation of degraded habitat	Prior to commencement of construction and following baseline habitat assessment	Ongoing management if required
Pest Animal Management	Prepare Weed and Pest Management Plan	Develop and implement a Weed and Pest Management Plan to identify and manage pest animals on site	Upon acceptance of MDPRP and project approval	Once only
		Ground-truthing and mapping of pest animal damage	Upon acceptance of MDPRP and project approval and prior to construction	Once only



Management or monitoring component	Activity	Description	Timing	Frequency (or until performance outcome reached)
Monitoring	Black-throated Finch	Conduct Seasonal BTF Surveys of development area and retained habitat	Upon acceptance of MDRP and project approval, prior to commencement of works (one (1) set of biannual seasonal BTF surveys (breeding season - March to May; and late dry season ensuring a maximum currency of two years), and yearly bi-annual season surveys post commencement of works.	Two (2) biannual seasonal baseline surveys prior to commencement of works (breeding season (March to May – late wet season) and late dry season) Bi-annual seasonal surveys post commencement of works and for five (5) years post completion works.
		Habitat condition	Upon acceptance of MDRP and project approval and prior to construction	Two (2) biannual seasonal baseline surveys prior to commencement of works (breeding season (March to May – late wet season) and late dry season) Bi-annual seasonal surveys post commencement of works and for five (5) years post completion works.
	Water	Visually monitor surface water resources in the retained habitat area in the northern section of the site (refer Section 6 – Monitoring).	Upon acceptance of MDRP and project approval and prior to construction	Annually for five (5) years
	Vegetation	Conduct baseline RE mapping surveys	Upon acceptance of MDRP and project approval and prior to construction	Once only
		Establish BioCondition monitoring sites and control sites	Upon acceptance of MDRP and project approval and prior to construction	Once only prior to commencement of works.
		BioCondition monitoring	Following initial baseline surveys prior to construction, implementation of an annual rehabilitation monitoring program post commencement of works and for a period of 5 years post completion of construction and rehabilitation works.	Once prior to commencement of works to establish monitoring sites as above (ensuring a maximum currency of 2 years). Annually post commencement of works and for five (5) years post completion of works.
		Establish photopoint monitoring sites	Immediately prior to construction	Annually for five (5) years post commencement of construction
	Weeds	Monitored through the BioCondition Monitoring program	Upon acceptance of MDRP and project approval, prior to construction (minimum of one survey, with a maximum currency of two years), and annually post commencement of works)	Upon acceptance of MDRP and project approval, prior to construction (minimum of one survey, with a maximum currency of two years), and annually post commencement of works)



Management or monitoring component	Activity	Description	Timing	Frequency (or until performance outcome reached)
	Pest animals	Implement pest animal monitoring program	Upon acceptance of MDRP and project approval, prior to construction (minimum of one survey, with a maximum currency of two years), and annually post commencement of works)	Upon acceptance of MDRP and project approval, prior to construction (minimum of one survey, with a maximum currency of two years), and annually post commencement of works)
		Assessment of habitat damage (5 permanent quadrats randomly placed	Upon acceptance of MDRP and project approval and prior to construction	Annually for five (5) years post commencement of construction



8. Adaptive management framework

Adaptive management is a process that deals with uncertainty and incomplete knowledge by using systematic approach and monitoring to reduce uncertainty inherent within unpredictable systems like natural systems, and improve management actions overtime (Wheatbelt NRM 2013). It has become the preferred method of natural resource management (NRM) in Australia over the last two decades (Wheatbelt NMR 2013). The monitoring program that will provide data to inform and improve the management actions in this MDPRP have been outlined above (Section 6). However, 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 within the Project site;
- provide invaluable insight into the use of passive relocation techniques as an effective conservation management tool for the BTF; and
- employ appropriate regular review and analysis of the monitoring data to refine the monitoring program and refine the 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).

The Significant Impact Guidelines, existing knowledge of BTF life history and ecology as well as expert advice have provided information for the monitoring program and management actions proposed in this MDPRP. The ongoing monitoring program will inform the management actions over time which in turn will help to develop more effective monitoring programs for the BTF.

All of these steps will allow ongoing revision and improvement of this MDPRP over time.



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