Appendix Q Offset Management Plan

Lansdown Eco-Industrial Precinct Water and Sewer Alignment

Offset Management Plan

06/09/2023

Job Number: VS0366

Evolve Environmental Solutions Pty. Ltd.

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Acronyms

AOG – Offset Assessment Guide
AU – Assessment Unit
BBBQ – Black-Breasted Button Quail
BPA – Biodiversity Planning Assessment
BVG – Broad Vegetation Group
SBTF – Southern Black-Throated Finch
DCCEEW – Department of Climate Change, Energy, the Environment and Water
DCDB – Digital Cadastral Database
DES – Department of Environment and Science
DNRME – Department of Natural Resources, Mines and Energy
EOPA – Environmental Offset Protection Area
EPBC – Environment Protection and Biodiversity Conservation
HQS – Habitat Quality Score
LGA – Local Development Area
MHQA – Modified Habitat Quality Assessment
OMP – Offset Management Plan
RE – Regional Ecosystem
REDD – Regional Ecosystem Description Database
RRD – Ross River Dam
SEQ – South-East Queensland
SOIC – Strategic Offset Investment Corridor
SPRAT – Species Profile and Threats Database
SRI – Significant Residual Impact
VMA – Vegetation Management Act 1999

Terms

Broad Vegetation Groups - represent a combination of regional ecosystems grouped by similar vegetation communities. There are three scales of BVGs mapped in Queensland; 1:1,000,000 (regional), 1:2,000,000 (state) and 1:5,000,000 (national). The 1:1,000,000 (regional) scale mapping applies to the offsets framework.

Conservation outcome - has the same meaning as per the Environmental Offsets Act 2014.

Environmental offset - has the same meaning as per the Environmental Offsets Act 2014.

Environmental Offset Protection Area - has the same meaning as per the Environmental Offsets Act 2014.

Offset Management Plan – Has the same meaning as defined in the Environmental Offset Agreement for the SEQ Regional Ecosystem Project for which this document forms a Schedule to.

Offset Site – An area of nominated land designated for on-ground offsetting of significant residual effects, impacted through the development. The site's allotment is defined per Table 18 and the area is described and depicted in Plan 4 - 10.

Regional Ecosystems - are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler and Williams 1999, Vegetation Management Act 1999).

SEQ Regional Ecosystem Offset Project - is a project established by the Department to identify, legally secure and manage potential Offset Sites in South East Queensland to deliver a Conservation Outcome for key matters of State environmental significance impacted by Prescribed.

Strategic Offset Investment Corridors - identify some of the best places in the landscape for environmental offsets. They mainly consist of core areas of largely intact remnant vegetation, generally associated with protected areas such as national parks, or areas that provide important links between those core areas. The Department of Environment and Science is identifying SOICs in each bioregion of Queensland with local input from regional Natural Resource Management groups, ecology experts, landholders, and local government.

1 Introduction and Purpose

Evolve Environmental Solutions (**Evolve**) were engaged by CDM Smith on behalf of Townsville City Council), to prepare an Offset Management Plan (OMP) to the further Information required as a part of the Preliminary Documentation approval process regarding the Lansdown Eco-Industrial Precinct Project development (LEIP).

1.1 Background

Townsville City Council (TCC) is proposing the development of enabling infrastructure[1] as part of the LEIP, providing upgraded road access and water supply to the precinct (the Project). The Project has been referred under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) on 21 December 2021, and subsequently, the Project has been declared a "Controlled Action" and requires an assessment by Preliminary Documentation (PD) pursuant to Section 18 and 18A (listed threatened species and communities – refer **Table 1**).

Table 1. Requirements under Section 6. Offsets of Request for Further Information Lansdown Eco-Industrial Precinct Enabling Infrastructure, near Woodstock Qld (2022/09383) (23 December 2022)

Information required	
6.1	An assessment of the likelihood of residual significant impacts occurring on relevant protected matters, after avoidance, mitigation and management measures have been applied.
6.2	A summary of the proposed environmental offset, if required in accordance with the assessment of significant residual impact, and key commitments to achieve a conservation gain for each protected matter.
6.3	If an offset area has not been nominated, include a draft OS as an appendix to the preliminary documentation. The draft OS must meet the information requirements set out in Appendix B.1.
6.4	Where offset area/s have been nominated, include a draft OMP as an appendix to the preliminary documentation. The draft OMP must meet the information requirements set out in Appendix B.2, and must be prepared by a suitably qualified ecologist and in accordance with the department's *Environmental Management Plan Guidelines* (2014), available at: www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines.

Under the principles and objectives of the EPBC Act and EPBC Act Environmental Offsets Policy 2012, and in response to a Request for Further Information (RFI), issued by the Department of Climate Change, Energy, the Environment and Water (the DCCEEW) on the 23rd of December 2023, the Project requires a land based offset as a part of the approval process to offsets matters of national environmental significance that have been deemed to have a Significant Residual Impacts (SRI) on a particular matter or species. The prescribed SRI involves the damage, reduction and or clearance of habitat quality of the Black-Throated Finch (*Poephila cincta cincta*).

1.2 Purpose

The purpose of an OMP is to provide high level guidance for the creation and implementation of offset mechanisms, which includes establishing a process, and developing strategies and measures to achieve a conservation outcome. The OMP will ensure a conservation outcome is achieved for the

[1] *Lansdown Eco-Industrial Precinct Enabling Infrastructure, near Woodstock Qld (2022/09383)*

prescribed environmental matter, the Southern Black-Throated Finch (the BTF) and associated significant residual impacts on its habitat. The BTF is listed as an Endangered species under the EPBC Act and a Matter of National Environmental Significance.

The objective of the environmental offset is to deliver measurable benefits that counterbalance the loss of habitat and ecosystem services at the impact site based on approved scientific methods and management actions, aiming to improve the condition over a 20-year timeframe. The conservation outcome (environmental uplift) is measured against a predicted environmental condition of the selected offset site.

In general, the OMP supports this approach by:

- Ensuring the offset site is of an appropriate scale and representative environmental condition, relative to the size and condition of the impact site, ensuring feasibility to achieve offsetting actions;
- Conducting scientific baseline surveys and measuring changes in condition over time;
- Providing a schedule of customised management actions to combat specific threatening processes;
- Developing strategies and mitigation measures to minimise potential risks to offset delivery;
- Necessitating monitoring reports, annual reviews, and incorporation of an adaptive management approach based on recorded performance of management measures; and
- Legally securing the offset site for protection of the duration of the prescribed significant residual impact on the impact site.

1.3 Previous Survey Effort

To inform this OMP, several ecological surveys have been completed by Evolve within the Project impact area (the Impact Site). Therefore, this OMP should be read in conjunction with the '*Lansdown Eco-Industrial Precinct – Enabling Infrastructure: EPBC Act Draft Preliminary Documentation'*

1.4 Significant Residual Impact (SRI) at the Impact Site

The prescribed impacted matter (MNES) and the associated Significant Residual Impact on its habitat, as per the assessment results of the LEIP HQA Report relate to habitat of the Black-Throated Finch (BFT). In total, **77.78 ha of habitat** with a habitat quality score of **6.77 out of 10** at the impact site is the prescribed SRI (Refer **Table 2**).

Table 2. Matter of impact and the associated SRI to BTF habitat

Matter of impact attributes	Details	Rationale
Common name	Southern Black-throated Finch	
Species	*Poephila cincta cincta*	
Conservation Status	Endangered	EPBC Act
Area Impacted	77.78 ha	SRI as per the HQA Report (Evolve)
Habitat quality score	6.77	As per the HQA Report (Evolve)

2 Impact Site Survey

The preparation of the LEIP HQA Report involved comprehensive site survey studies to assess habitat quality in accordance with the Modified Habitat Quality Assessment (MHQA) methodology. The methodology in general sets out guidelines to:

1. Assess the potential species specific impact as per the preliminary documentation determination, and;
2. Assess the modified habitat baseline values of the selected Offset Site to inform the biodiversity offset calculations for uplift of the site.

2.1 Survey Timing

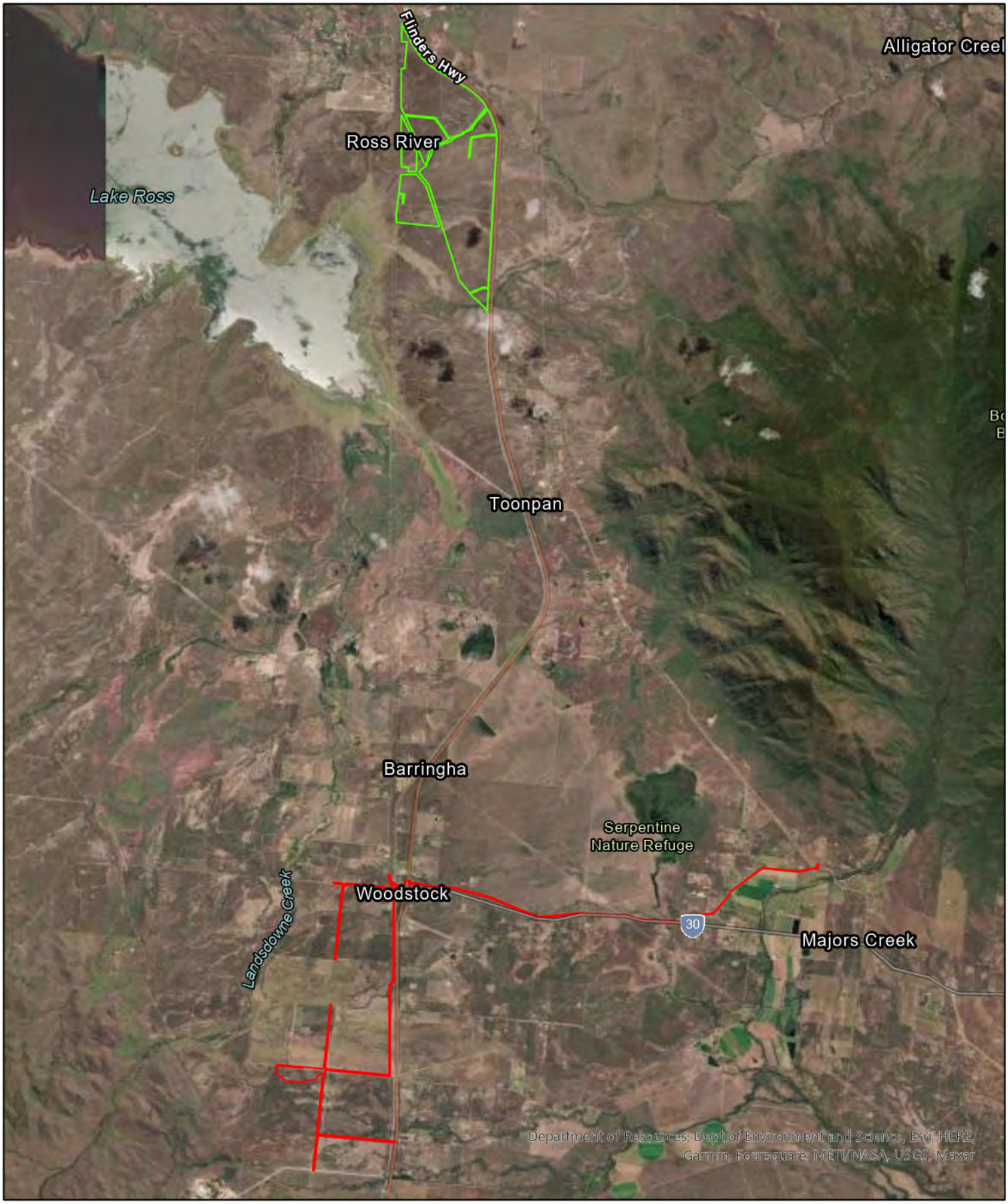
Motion sensor cameras, Audiomoth acoustic recording devices and Anabat passive bat detectors were deployed for 3–4-night periods during on-site survey works. Fauna observations, and waterway and vegetation assessments were conducted over the entirety of the survey period 6th to 10th February 2023.

Survey works were undertaken in accordance with relevant Department of Environment and Science, Department of Agriculture and Fisheries and the Unpublished MQHA methodologies and guidelines as outlined in Section 2.3 – 2.5 of this OMP, with the aim to:

- Undertake habitat assessments;
- Survey for threatened fauna; and
- Complete waterway assessments suitable for Operational Works development approvals for waterway barrier works.

2.2 Impact Site Context

The Impact Site of the Project is located approximately 40km south of Townsville CBD along the western side of the Flinders Highway. The LEIP road and water infrastructure alignments traverses Ghost Gum Road, Bidwilli Road, Manton Quarry Road and associated easements (refer **Figure 1**).



Legend

- Offset Investigation Area
- Impact Site Boundary

0 1 2 Kilometers

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Figure 1 Site Context
17/04/2023

Figure 1: Site Context

EVOLVE environmental solutions

Client: CDM Smith
Project: Landsdown Eco-Industrial Precinct

2.3 Modified Habitat Quality Assessment (MHQA) Methodology

Assessment of fauna species habitat quality was carried out as per guidelines published in Chapter 2.4 of *Guide to determining terrestrial habitat quality-Methods for assessing habitat quality under the Queensland Environmental Offsets Policy. Version 1.3.* and *BioCondition-A Condition Assessment Framework for Terrestrial Biodiversity in Queensland Assessment Manual Queensland Herbarium Version 2.2 (February 2015).*

Habitat Quality was scored for five keystone species deemed likely to occur in the area, identified from previous surveys. These Species were the Southern Squatter Pidgeon (*Geophaps scripta scripta*), Black-throated Finch (*Poephila cincta cincta*), Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*), Koala (*Phascolarctos cinereus*) and Painted Snipe (*Rostratula australis*). Habitat Quality was scored using a weighted table of five habitat quality criteria calculated from measured site attributes for each species as well as thirteen (13) site refence criteria and four (4) site context criteria undertaken as per the BioCondition methodology. The Habitat quality criteria assessed for each species were:

- Quality and Availability of food and foraging habitat;
- Quality and availability of shelter and breeding habitat;
- The support for mobility of the surrounding habitat.
- The role of site location to overall population in the state; And
- Threats to the prescribed matters.

For the purpose of this OMP, solely the habitat scoring and parameters for the prescribed matter, the BTF, are outlined and described in Section 3.

2.3.1 BioCondition Assessment

BioCondition Assessments were undertaken by the methodology detailed in the BioCondition Manual (Eyre, et. al., 2015) in accordance with BioCondition sampling effort recommendations published in Table 1.2 of Guide to determining terrestrial habitat quality V1.3 (Department of Environment and Science, 2020)

2.3.2 Quality and Availability of Food and Foraging Habitat of the BTF

Site attributes indicating quality of food and foraging habitat for the BTF were averaged to produce a score for the criteria overall, these were:

- Abundance of food grass: The average coverage of preferred food grasses across five (5) 1x1 metre BioCondition quadrats was measured during both impact and offset habitat quality assessments. The BTF is primarily granivorous, and grass seed availability is an indicator of foraging habitat quality. Greater than 25% cover is favourable (NRA, 2011)
- Species richness of food grasses: Number of preferred grass feed species detected within the standard BioCondition Plot is an indicator of foraging habitat quality as a higher species diversity and a mixture of annuals and perennial species allows for a broader time-period in which seed production occurs. Six or more species of food grasses within a plot is indicative of sufficient habitat (NRA, 2011). Favourable food grass species (Mitchell, 1996; NRA, 2007) include:
    - Sabi Grass (*Urochloa mosambicensis*)
    - Crab grass (*Digitaria ciliaris*)
    - Red Natal Grass (*Melinis repens*)
    - Curly windmill grass (*Enteropogon acicularis*)
    - Native millet (*Panicum decompositum*)

  - Hairy panic (*Panicum effusum*)
  - Bluegrass (*Dichanthium sericeum*)
  - Cockatoo grass *Alloteropsis semialata*
  - Woodland lovegrass (*Eragrostis sororia*)
  - Kangaroo grass (*Themeda triandra*)
  - Purple-top Chloris (*Chloris inflata*)
- Mosaic of bare patches and grasses: The average coverage of bare ground across five (5) 1x1 metre BioCondition quadrats was measured. Southern Black-Throated Finch requires sufficient bare ground patches to access the seed bank through unvegetated areas. Areas with 40.59% ± 19.28% Bare ground cover with a maximum of 85% have been observed as having a positive association with the subspecies (Rechetelo, 2015).

2.3.3 Quality and Availability of Shelter and Breeding Habitat - BTF

Site attributes indicating quality of shelter and breeding habitat for the BTF were averaged to produce a score for the criteria overall, these were:

- Abundance of preferable nesting tree species: Following tree species are considered Suitable Nesting trees (Rechetelo 2015):
  - Poplar gum (*Eucalyptus platyphylla*)
  - Broad-leaved paperbark (*Melaleuca viridiflora*)
  - Moreton Bay Ash (*Corymbia tessellaris*)
  - Dallachy's ghost gum (*Corymbia dallachiana*)

  Abundance was measured by coverage of canopy intersecting with the transect.
- Distance to water: Distance to permanent water source for each habitat assessment was measured using by desktop analysis. The Southern black throated finch is an obligate drinker, requiring a constantly available water source. Nesting habitat is typically found close to permanent water sources, typically within 200m and not more than 400m. (NRA 2011).

2.3.4 Role of Site Location to Overall BTF Population in the State

This value was obtained from the species stocking rate, adjusted to a score of 10, as detailed in Section 4.2 of the *Commonwealth How to Use the Offsets Assessment Guide.*

2.3.5 Threats to the BTF

Threats to species were calculated using a threat matrix as per methodology detailed in *Guide to Determining Terrestrial Habitat Quality* (DES, 2020). For the BTF, a degree of threat was given a score out of 25 using the threat matrix as illustrated below in **Table 3**.

Table 3. Threat assessment matrix (DES, 2020)

Threat Matrix			Severity				
			Very High	High	Medium	Low	Very Low
			1	2	3	4	5
Scope	Very High	1	1	2	3	4	5
	High	2	2	4	6	8	10
	Medium	3	3	6	9	12	15
	Low	4	4	8	12	16	20
	Very Low	5	5	10	15	20	25

Significant threats identified to the BTF were as follows:

- Reduction In water availability: Southern Black Throated Finch is an obligate drinker and reduction in water availability, by drought for example, without sustained permanent water sources would significantly impact the ability for the Southern Black Throated Finch to utilize the habitat (DEWHA, 2009).
- Intensive grazing regimes: Overgrazing to the point of food seed depletion may reduce the capacity of the habitat to produce sufficient food for the Southern Black Throated Finch (DEWHA, 2009).
- Risk of fire: Fire during breeding season can cause disturbance to nesting habitat and failure of breeding (DEWHA, 2009).
- Exotic weed dominance: Exotic weeds can reduce availability of quality habitat and food grasses to the Southern Black (DEWHA, 2009).

2.3.6 Species Mobility Capacity - BTF

The species mobility capacity of the habitat for Southern Black Throated Finch was scored out of 25 based and assessed as follows:

- Coverage of shrub species, including native and introduced species: This was measured by intersection with a 100m transect. Flocks of the subspecies are negatively associated with excessive shrub cover (Rechetelo 2015).
- Prescence of open grassy woodland vegetation structure: In each 100m by 50m BioCondition plot the vegetation was assessed for quality and connectivity of open woodland structure.

2.3.7 Species Stocking Rate - BTF

Species stocking rate was calculated for each assessment unit using the scoring system provided by the EPBC Act How to Use the Offsets Assessment Guide. Four criteria were assessed, Species presence on or adjacent to the site, Species usage of the site, approximate density per hectare and Importance of the species on the site.

2.3.8 Habitat Mapping Methodologies - BTF

The Black throated finch inhabits woodland savannahs, and areas of riverine vegetation. As a general rule areas of seeding grass within 5km of a permanent water source can be considered habitat in the species model distribution area. The offset site provides suitable BTF foraging or breeding habitat with

three permanent water resources flowing across open woodland and seeded grassland areas with riparian corridors situated on the offset site. The Ross River Dam (RRD) waterbody provides an adjacent fourth permanent water resource, however, due to its' nature as freshwater reservoir can differ in extent and proximity to the offset site.

Vegetated areas have been noted as breeding due to the species nesting requirements, whilst grassland only areas have been noted as foraging. Regularly slashed and maintained roadsides such as along Flinders Highway and the maintained tracks throughout the site have been excluded from foraging habitat as the seeds of grasses would be largely absent from these areas.

Table 4 outlines the MHQA methods and scoring rubric that has been used to qualify the habitat features for the BTF on both the impact and offset site. Scoring is applied on a scale of 5 to 25 based on increments of 5, with a scoring of 5 representing absence of the assessment attribute and 25 indicating an optimal condition of the BTF habitat attribute. Habitat assessment locations are illustrated in the LEIP HQA Report**.**

Table 4. Modified Habitat Quality Assessment Methods for BTF

Attribute	Scoring System				
	5	10	15	20	25
Southern Black-throated Finch					
Quality and Availability of Food and Foraging Habitat					
Abundance of preferable grass species	Absent	Present at less than 10% coverage	10% to 25% coverage	25% to 75% coverage	Greater than 75% coverage
Species richness of preferable food grasses	Absent	1 or 2	3 or 4	5 or greater with only annual species present	6 or greater with annual and perennial species present
Mosaic of bare ground and grass cover	No Bare Ground, or, 100% weed cover	Less than 5%, or, greater than 85% bare ground cover	Between 5% and 15%, or, between 70% and 85% bare ground cover	Between 15% and 20%, or, between 60% and 70% bare ground cover	Between 20% and 60% bare ground cover
Quality and Availability of Shelter and Breeding Habitat					
Abundance of preferable nesting tree species	Absent	*E.platyphylla, C. tessellaris* or *C. dallachiana* cover 0 – 5%, *M. viridiflora* canopy < 3 m	*E.platyphylla, C. tessellaris* or *C. dallachiana* cover 5 – 15% or > 50%, *M.viridiflora* canopy 3 - 5 m	*E.platyphylla, C. tessellaris* or *C. dallachiana* cover 15 – 20% or 30 - 50%, *M.viridiflora* canopy 5 - 6 m	*E.platyphylla, C. tessellaris* or *C. dallachiana* cover 20 – 30% with hollows, and/or mature *M.viridiflora* canopy (>6 m) present
Distance to water	Greater than 1.5km	1-1.5km	400m-1km of a watersource available during breeding season	200m-400m of a watersource available during breeding season	Within 200m of a watersource available during breeding season

Attribute	Scoring System				
	5	10	15	20	25
Quality and Availability Habitat for Mobility					
Coverage of shrub species, including native and introduced species	Greater than 70% abundance	50% to 70% abundance	30% to 50% abundance	10% to 30% abundance	less than 10% abundance
Prescence of open grassy woodland vegetation structure	Absent	Present with significant degradation understory and canopy layer	Present with suitable grassland species, but significant degradation of canopy layer	Present with suitable open woodland canopy cover, but low species diversity in grass layer	High quality open woodland with low shrub density
Absence of threats					
Reduction In water availability	Very High	High	Medium	Low	Absent
Intensive grazing regimes	Very High	High	Medium	Low	Absent
Risk of fire	Very High	High	Medium	Low	Absent
Exotic weed dominance	Very High	High	Medium	Low	Absent

2.4 Fauna Assessment Methodologies

Fauna assessments were carried out as per survey guidelines published in *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland,* Eyre et. al. (2018) and *Significant impact guidelines for the endangered black-throated finch (southern) (Poephila cincta cincta)* (2009). Refer to the LEIP HQA Report for locations of these surveys.

2.4.1 Camera Trapping

Motion sensor cameras were deployed for a minimum period of four (4) nights during the survey weeks. The following methodology was employed during the camera trapping surveys:

- Cameras were installed in key locations on site;
- Cameras securely attached 10 – 50 cm from the ground on a tree or post;
- Cameras were not baited; and
- Cameras were set on the burst function of 3 photos per trigger.

2.4.2 BTF Survey Method

As per the DCCEEW Survey guidelines for Australia's threatened birds, following survey methods were applied to: *In the tropics, locate and watch suitable waterholes late in the dry season and conduct area searches of savanna woodland. Also check around breeding black-faced woodswallow Artamus cinereus flocks in the early wet season (S. Garnett pers. comm.). Elsewhere use area searches of suitable habitat for sightings and checking flocks of other finch species.*

Table 5 provides a guide for minimum survey effort regarding the BTF, as per the Guidelines for detecting birds listed as threatened under the EPBC Act.

Table 5. Survey Methods for the Endangered Southern Black-Throated Finch

Methods	Hours	Days
Land-based area searches*	10	5
Targeted searches**	6	2

*For areas of less than 50 ha.

** Targeting waterholes and woodswallow nests.

2.5 Waterway Assessment

Waterways and drainage features were walked and captured by GPS. Photo points and aquatic features were noted at certain points along and near the crossing points, and additional crossing sections were noted that were not mapped as fisheries waterways but still would meet the definition of a waterway defined by the Department of Agriculture and Fisheries (DAF) as exhibiting at-least one of the following attributes:

1. *Defined bed and banks*
   The bed and banks need to be continuous upstream and downstream of the site rather than isolated and broken sections of a depression.
2. *An extended, if non-permanent, period of flow*
   Flow must continue beyond the duration of a rain event and have some reliability attached to rainfall. There is a need to distinguish between channels that funnel immediate localised rainfall; and waterways where flow has arisen from an upstream catchment.
3. *Flow adequacy*
   The flow needs to be sufficient to sustain basic ecological processes and habitats, and to maintain biodiversity within or across the feature. The adequacy of the flow depends on the ecological function of the channel e.g., waterways that connect to fish habitat like a wetland or waterhole may only need infrequent and short-duration flows to provide connectivity for fish.
4. *Fish habitat at, or upstream of, the site*
   Most instream features provide habitat for fish under adequate flow conditions or, in the case of pools, during dry periods. Therefore, it is important to have some knowledge of the fish species for the site and

their habitat use, particularly in headwater streams. Periodic connectivity to upstream and off stream fish habitat are also considered fish habitat.

Refer to the LEIP HQA Report for a detailed description and graphic presentation of the survey locations, the assessment locations, and the locations our recording devices were deployed at during the impact survey study.

3 Impact Area BTF Habitat Quality Results

The Impact survey involved seven (7) Assessment Units (AU's). The total impact area of assessed BTF habitat within the seven AU's encompasses 77.78 ha. **Table 6** illustrates the individual proportion of the total impact extent per AU.

Table 6. Assessment Units (AU) and the corresponding RE's, impacted area extent, number of assessments as per BioCondition benchmark, and appropriate weighting per remnant status and sitewide approach.

AU	RE (remnant / regrowth)	Impact area (ha)	Assessments	Weighting Rem/Non-Rem	Weighting Sitewide
1	11.3.30 Remnant	25.11	11	0.8	0.323
2	11.3.30 Non-Remnant	40.07	16	0.86	0.515
3	11.3.35 Remnant	3.26	6	0.1	0.042
4	11.3.35 Non-Remnant	6.3	4	0.14	0.081
5	11.3.27e Remnant	0.26	1	0.01	0.003
6	11.3.25b Remnant	0.91	2	0.03	0.012
7	11.3.12 Remnant	1.87	1	0.06	0.024
Total	-	**77.78**	**41**		

Two regional Ecosystems occurred on site in both remnant and non-remnant forms these were RE 11.3.30 and RE 11.3.35. Overall, the condition of both remnant and non-remnant RE 11.3.35, AU3 and AU4 respectively, were the lowest among other remnant and non-remnant vegetation groups occurring on site. AU3 scored 28 percent of the maximum vegetation quality score and AU4 scored 5 percent of the maximum vegetation quality score.

AU5 and AU7 occurred in regional ecosystems without a benchmark and so due to the small size and degraded ecological value of these assessment units, as well as lack of availability of accessible benchmark survey sites, a rapid assessment method was used to assume a score of 70% of the maximum for attributes which could not be assessed against a benchmark as described in *Guide to Determining Terrestrial Habitat Quality v1.3*. Non-native cover was excluded from this as the benchmark for this attribute is always 0, and instead, was calculated as per standard BioCondition methodology.

3.1 BTF Habitat Scores

A summary of scores for each criteria of the habitat quality for Southern Black Throated Finch is summarised in **Table 7** and overall habitat quality scores are presented in **Table 9**. Habitat quality scores at the Impact Site were **intermediate** ranging from **6.2** to **7.67.** The weighted scoring for non-remnant and remnant vegetation unit areas is respectively **6.64** and **6.96.** Proportionate to the total survey area extent, the non-remnant vegetation units partake 60% of the impacted habitat site total, while the remnant vegetation sample units altogether encompass 40% of the total BTF habitat survey areas. Considering these proportions, this results in an overall (sitewide) BTF habitat quality score of **6.77** (60% of 6.64 + 40% of 6.96).

Table 7. Habitat quality assessments of the Southern Black Throated Finch summarised by assessment unit.

Assessment Unit Regional Ecosystem	**AU1** Remnant 11.3.30	**AU2** Non-remnant 11.3.30	**AU3** Remnant 11.3.35	**AU4** Non-remnant 11.3.35	**AU5** Remnant 11.3.27e	**AU6** Remnant 11.3.25b	**AU7** Remnant 11.3.12
Foraging Habitat							
Abundance of preferable grass species	14.55	13.44	13.33	22.50	20.00	10.00	15.00
Species richness of preferable food grasses	16.82	12.19	12.50	11.25	15.00	25.00	25.00
Mosaic of bare ground and grass cover	14.55	15.00	7.50	5.00	5.00	7.50	20.00
Average Score	15.30	13.54	11.11	12.92	13.33	14.17	20.00
Shelter Habitat							
Nesting tree availability	13.64	10.74	14.17	5.00	15.00	17.50	20.00
Distance to water	17.73	21.25	21.67	17.50	25.00	25.00	20.00
Average Score	15.68	15.99	17.92	11.25	20.00	21.25	20.00
Role of site to overall population	5	5	5	5	5	5	5
Threats*							
Reduction In water availability	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Intensive grazing regimes	15.45	11.25	13.33	15.00	20.00	20.00	20.00
Risk of fire	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Exotic weed dominance	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Lowest score	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Species Mobility*							
Coverage of shrub species, including native and introduced species	24.55	25.00	25.00	25.00	25.00	20.00	25.00
Prescence of open grassy woodland vegetation structure	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Average Score	19.77	20.00	20.00	20.00	20.00	17.50	20.00

* While Threats to Species and Species Mobility Capacity were initially scored out of 25 as seen in this table, this was proportioned to a score out of 15 and 10 respectively to be in line with the federal modified habitat quality assessment template

3.1.1 BTF Foraging Habitat Scores

Average foraging habitat scores for each AU were intermediate to high, ranging from 11.11 to 20 out of 25. A mosaic of bare ground and grass cover of intermediate to high quality was recorded in AU1, AU2 and AU7, ranging from scores of 14.55 to 20; however, was seen to a lesser degree in AU3, AU4, AU5 and AU6 with scores ranging from 5 to 7.5. An overabundance of pasture legumes, primarily shrubby stylo, across all AUs was a large driver of reduced bare ground coverage.

3.1.2 BTF Shelter Habitat Scores

Average shelter habitat scores for each AU were intermediate to high, ranging from 11.25 to 21.25. Permanent water availability was generally high due to a number of dams waterways and cattle watering points spread across the surrounding landscape; average water availability scores ranged from 17.5 to 25. Nesting Tree availability varied

greatly between AUs ranging from scores of 5 to 20, and was lower in Non remnant AUs, AU2 and AU4 with scores of 10.74 and 5 respectively.

3.1.3 Species Mobility Scores

Average species mobility scores were high ranging from 17.5 to 20. Shrub coverage scores were generally high with scores ranging from 20 to 25 out of 25, this is due to a sparse shrub layer throughout all assessment units. Vegetation structure had generally high grass species diversity, however, the ground layer coverage was generally dominated by introduced species in many cases and canopy layers were generally degraded leading each AU to have an average score for the criteria of presence of open grassy woodland vegetation structure to be 15.

3.1.4 Species Stocking Rate

The Southern Black Throated Finch was allocated a species stocking rate of 55 out of 70 for the site, resulting in an overall SSR of **3.14** for the site. The calculation is provided in **Table 8.**

Table 8. Species stocking rate calculation for the Southern Black Throated Finch

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		**10**
		No		Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10		**15**
		Not habitat	Dispersal	Foraging		Breeding
Approximate density (per ha)	Score	0	10	**20**		30
Role/importance of species population on site	Score	0	5	**10**		15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)		**55**				
SRR Score (out of 4)		**3.14**				

*Highlighted red text shows calculation pathway

3.1.5 Overall BTF Habitat Quality Score on Impact Site

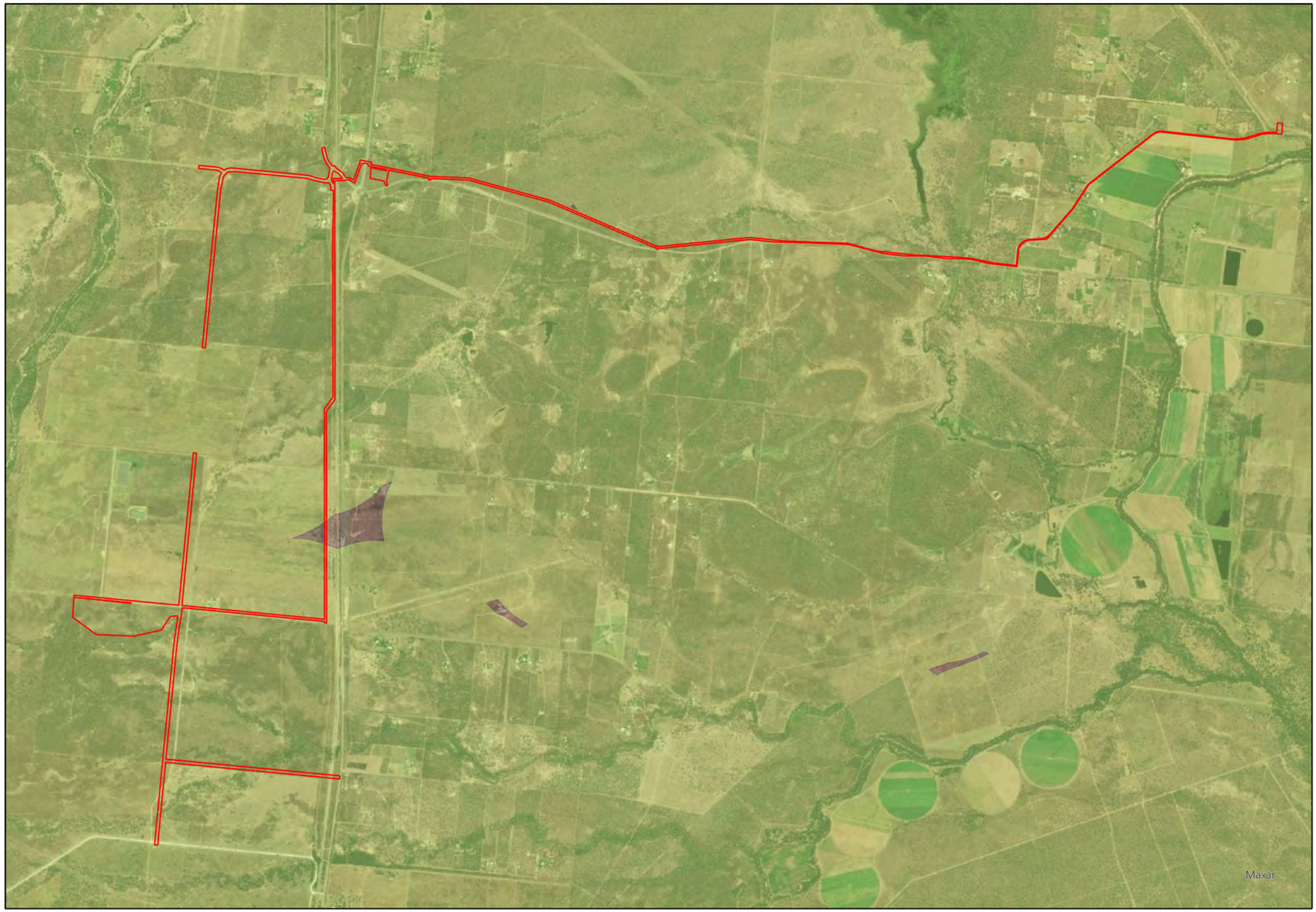
Table 9 outlines the habitat scoring as described under section 3.1.1 to 3.1.4 and provides weighted total scoring. The sitewide habitat quality score of **6.77** for the prescribed matter (the Southern Black-Throated Finch) in correlation with the total calculated area of impact, provide the essential input parameters to the Commonwealth Offset Calculator.

Table 9. Overview of Management and Assessment Units Habitat Scoring for the BTF at the Impact Site.

Attributes	Management Unit 1: Non-Remnant Vegetation			Management Unit 2: Remnant Vegetation					
Final habitat quality score (weighted)	**AU2**	**AU4**	**Average/Final**	**AU1**	**AU3**	**AU5**	**AU6**	**AU7**	**Average/Final**
Site Condition score (out of 3)	1.16	0.65	0.91	1.37	1.19	1.90	1.66	2.12	1.65
Site Context Score (out of 3)	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41
Species Stocking Rate Score (out of 4)	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Habitat Quality score (out of 10)	6.71	6.20	6.46	6.92	6.74	7.45	7.21	7.67	7.20
Assessment Unit area (ha) in disturbance footprint	40.07	6.30	46.4	25.11	3.26	0.26	0.91	1.87	31.4
Total impact area (ha) for this MNES	46.4	46.4	46.4	31.4	31.4	31.4	31.4	31.4	31.4
Size Weighting	0.86	0.14	1.0	0.80	0.10	0.01	0.03	0.06	1.0
Weighted Habitat Quality Score	5.80	0.84	**6.64**	5.53	0.70	0.06	0.21	0.46	**6.96**
Overall site size weighting	40.07	6.30		25.11	3.26	0.26	0.91	1.87	
Total Site BTF Habitat Score									**6.77**

Plans 1, 2 and 3 further illustrate the impact site scoring on size patch, connectedness, habitat context and ecological corridors.

Plan 1. BTF Habitat Patch Size & Connectedness



Legend

- Potential BTF habitat (>500 ha)
- Site Boundary (>75% intesection with boundary)

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	18/04/2023	Preliminary	RH	AH

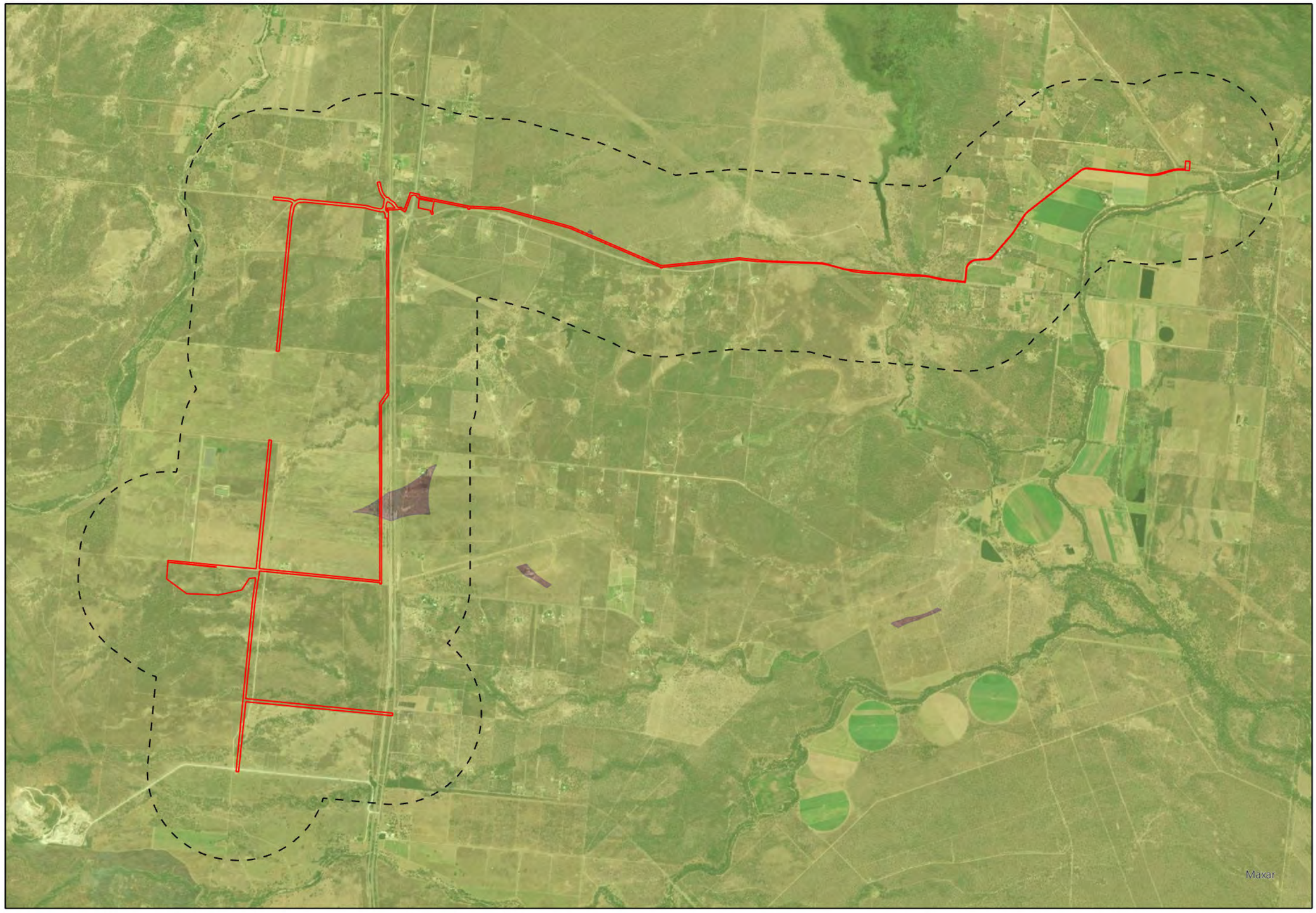
0 250 500 1,000 1,500 2,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Impact Site

Date: 18/04/2023
Impact Site Assessment

Plan 2. BTF Habitat Context



Legend

- 1km Site Buffer (>75% BTF Habitat)
- Site Boundary Polygon
- Potential BTF habitat

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	18/04/2023	Preliminary	RH	AH

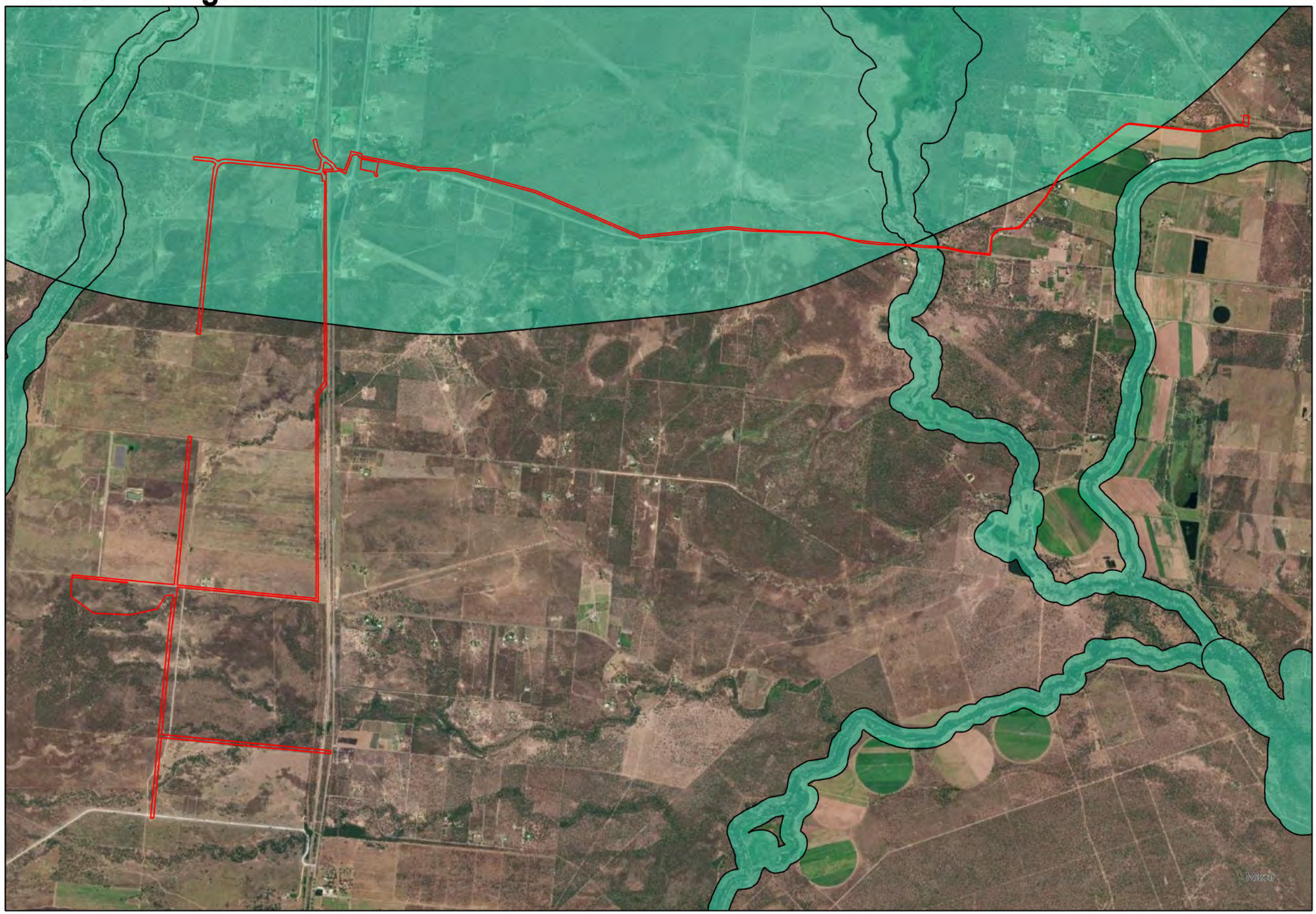
0 250 500 1,000 1,500 2,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Impact Site

Date: 18/04/2023
Impact Site Assessment

Plan 3. Ecological Corridors



EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	17/04/2023	Preliminary	RH	AH

0 250 500 1,000 1,500 2,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Impact Site

Date: 17/04/2023
Impact Site Assessment

4 Offset Policy and Principles

The following section of this OMP highlights the adequacy of this offset for the Black-throated Finch against the EPBC environmental Offsets Policy's 10 key principles.

4.1 Principle 1

Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.

Response:
The offset for the LEIP project has been designed to offset the significant residual impact for the Black - Throated Finch. Sections 6 - 8 of this report have specifically highlighted how and where the conservation outcomes or uplift will be met of the 20-year life of the offsets project. With the use of the MHQA tool and the conservation measures highlighted throughout this report, uplift of the chosen site will be achieved to offset the proposed impact. Uplift coupled with legal securement of suitable land close to the impact site, allows this offset to adequately meet the intent of principle one in the offsets policy. Further, the modest gain of one point in overall scoring is both achievable and realistic. Based on the calculations performed on the improvement of the site regarding management actions and securement of the offset site, the proposed offset site will **offset 105.56% of the impact** (as per EPBC Calculator)

4.2 Principle 2

Suitable offsets must be built around direct offsets but may include other compensatory measures.

Response:
As per the offset policy, it is dictated that the chosen offset site provides suitable habitat for offsetting of the prescribed SRI and **facilitates compensation of 105.56% of the total proposed impact**. This is considered in line with the requirements of principle 2. No compensatory measures have been used as per this OMP report.

4.3 Principle 3

Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.

Response:
The offset site will be locked down under the Voluntary Declaration (VDec) as per the Vegetation Management Act (VMA).

The VMA has always contained a process for the Minister or Governor in Council to make a declaration over an area to protect high nature conservation values and areas vulnerable to land degradation. However, a VDec is a separate mechanism which is declared by the chief executive and subject to different processes. The VDec process is provided for in sections 19E to 19L of the VMA under subdivision 2—Declarations by chief executive. The VDec process provides a simplified and streamlined procedure for landholders seeking to voluntarily protect native vegetation on their land. It also enhances the vegetation management framework by providing a voluntary protection mechanism and helps deliver other components of the VMA. This streamlined protection process makes it easier and more cost-effective for landholders to protect native vegetation for a range of purposes, such as:

- Participating in conservation incentive programs
- Providing legal security for offset areas required under the under the Environmental Offset Act 2014 (the Offsets Act) and exchange area required under the VMA
- Providing legal security for an exchange area under an accepted development vegetation clearing code
- Rehabilitating areas subject to land degradation
- Addressing Commonwealth offset requirements under the Australian Government's Carbon Credits (Carbon Farming Initiative) Act 2011 or Environment Protection and Biodiversity Conservation Act 1999 (EPBC)
- Other conservation purposes.

One of the strengths of a declaration is that it provides greater protection to areas of land containing environmentally valuable native vegetation. A declaration will remain in place until the outcomes in the management plan have been achieved, or in perpetuity should that be a condition of the approval. The declaration and management plan will be noted on the land title, which informs prospective buyers of current declarations and management plans and where copies are available. This information is important to the property market as future owners will be bound by the plan and declaration.

The use of the VDec under the VMA is considered suitable and therefore meets the requirements of Principle 3.

4.4 Principle 4

Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.

Response:

To meet principle 1 and deliver an overall conservation outcome, offsets need to be proportionate to the size and the scale of the impact. In general, this means that the larger your impact, the larger the offset will need to be. Sometimes the total size of an offset can be reduced if you are able to significantly improve the habitat in a certain area, or significantly decrease the risk that habitat would be lost in the future. The size and scale of an offset required is determined by considering the following:

- Level of statutory protection applied to the matter – already discussed in principle 3,
- Attributes that are being impacted,

The attributes being impacted have been discussed in the preliminary documentation as impact on potential foraging and breeding habitat for the Black-Throated Finch. As a part of the offset land site assessment, the following aspects where utilised to select an appropriate offset site:

    - The distance to the impact site (see section 5.1.2);
    - The likelihood of occurrence for BFT – Confirmed onsite through ground truthing (see section 5.4)
    - The suitability of BFT habitat through MQHA surveys (see section 5.4 and 5.5); and
    - The ability to improve and secure the offset land (see sections 9 and 12)

- Level of threat (risk of loss) a potential offset site is under,

Risk of Loss describes the chance that the habitat on the proposed offset site will be lost completely (i.e. no longer hold any value for the protected or impacted matter) due to anthropogenic drivers. There are a number of factors that could influence the risk of loss of a site, including: presence and strength of formal protection mechanisms currently in place on the proposed site (e.g. zoning, restrictive covenants or state vegetation clearing laws); presence of pending development applications, mining leases or other activities on the proposed offset site that indicate development intent and likelihood; and average risk of loss for similar sites. The threat of loss for this offset site would be zero, given there was no imminent plan to remove vegetation (complete loss).

- Time it will take for an offset to be delivered, and the extent to which an offset site might be improved.

Scores have conservatively been increased **by 1 point of habitat quality score** in terms of uplift over the management areas. It is important to note that the site has provided surplus land to what is required and that the gains highlighted in the document are extremely achievable. Management timing has been provided as 20 years however it is not anticipated that the management actions will require such a long timeframe.

As per the above the offset meets the requirements of principle 4.

4.5 Principle 5

Suitable offsets must effectively account for and manage the risks of the offset not succeeding.

Response:

The OMP has written into its framework adaptive management measures and risk mitigation strategies which are coupled with an additional surplus of offset land. The surplus results in an 'over and above' approach, providing sufficient bandwidth to adjust for any potential offset issue, if this would occur.

The offset meets the requirements of principle 5.

4.6 Principle 6

Suitable offsets must be additional to what is already required, determined by law, planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action).

Response

The OMP and land acquisition exists completely separate of any State of Local government requirement or conditions of approval. The nominated land in question requires specific land management techniques and principles that are specific to the BTF, which are highlighted in this documentation that extent 'above and beyond' the normal day to day land management requirements under State and Local laws. Therefore, the offset is considered to meet the requirements of principle 6.

4.7 Principle 7

Suitable offsets must be efficient, effective, timely, transparent, scientifically robust, and reasonable.

Response:

Determination of what is efficient, effective, timely, transparent, scientifically robust and reasonable, is described and defined throughout this document. Treatment of the offset area along with legal securement is stipulated to be well above and beyond the requirements for land management practice in Australia. Effectiveness is measured in the environmental gain of the offset site uplift. This uplift has been assured by scientifically robust land rehabilitation and management practices that will increase the suitability of BFT habitat in an area where BTF are known to inhabit (confirmed onsite).

The OMP and Offsets meets principle 7.

4.8 Principle 8

Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited, and enforced.

Response:

Site monitoring is to occur on biannual progress increments, which will chart the improvement of the site. It is important to note the site is to be managed by a rehabilitation professional, to ensure immediate and significant risk reduction of the project and in meeting the objectives. The use of the annual compliance report (ACR) will ensure transparent reporting and allow for the department to review and question outcomes. It also allows for adaptive management measures to occur timely and effectively and keep track of target milestones along the offset procedure. The ACR coupled with the use of measurable KPI's fulfills the requirements principle 8.

4.9 Principle 9

In assessing the suitability of an offset, government decision-making will be informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty.

Response:

As discussed in this section, the information used to guide this OMP has been derived from scientifically generated resources, offset industry knowledge and previously approved offset management strategies for the BTF. Together with the fact that the project will be managed and conducted by restoration and offset professionals, underpins

the adequate and appropriate implementation and achievement of the offset objectives and with regard to meeting the requirements of an offset under the EPBC Act.

4.10 Principle 10

In assessing the suitability of an offset, government decision-making will be conducted in a consistent and transparent manner.

Response:

At the stage of preparing this OMP, Evolve are unable to comment on the assessment of the OMP by Commonwealth Government Assessors.

5 Offset Site Assessment

An Offset Site was allocated following comprehensive desktop searches within the vicinity of the impact site and selected in collaboration with Townsville City Council. To assess the suitability of the allocated offset site, to offset the prescribed SRI on Southern Black Throated Finch habitat, a combination of further desktop analysis and on-ground field investigations was undertaken. During the desktop analysis the suitability assessment criteria below were utilised, and the results are outlined in this section (5.1):

- Site Context (bioregion and land zones)
- Proximity to Impact Site
- Existing remnant and non-remnant vegetation (RE's)
- Accessibility
- Water security
- Ecological connectivity
- Land tenure
- Historic land use and disturbance
- Suitability for revegetation
- Suitability to matters (MNES) for offsetting

5.1 Desktop Survey Methodology and Results

5.1.1 Offset Site Context

The allocated Offset Site (refer Figure 1) covers a land base of approximately 850 ha, consisting of seven (7) Regional Ecosystems (RE's). Five (5) RE's are spatially mapped as remnant and high-value regrowth, and two (2) RE's are mapped as non-remnant vegetation communities under the Vegetation Management Act. The offset site survey area is situated across sixteen (16) freehold land parcels, six (6) State-owned land parcels and includes four (4) easement parcels (Refer Section 5.1.4 -5.1.8). Within this area, field surveys were undertaken to select the most suitable land-based offsetting habitat for environmental uplift.

Three permanent waterways traverse through the site. The Antill Plains Creek bisects the site through the centre, flowing east to west. A tributary of the Antill Plains Creek flows through the northern aspect and the Stonehouse Creek runs across the most southern aspect. The permanent waterways consist of several small reaches that form intermittent drainage features discharging into the permanent waterways. On the eastern border, Flinders Highway and Mount Isa Railway line mark the boundaries. Directly north-west, contiguous with the Site, the landscape is partially shaped through stock grazing land use practices.

In the wider context, the hills of Bowling Green Bay National Park form a background and larger catchment area approximately 0.5 - 5km east of the site. Approximately 2.5km northwest of the site, the hills of Mount Stuart function as training grounds to the Australian Defence Force. Public access to the national park, the defence force training grounds and the RRD catchment management areas are heavily restricted to the public.

Figure 2 and 3 highlight the context of the impact and offset site in relation to the state modelled potential habitat and the MNES distribution mapping of the Black Throated Finch.

5.1.2 Proximity to Impact Site

The allocated Offset Site is situated between Townsville and the Impact Site, just south of a small rural town (Woodstock) and approximately 15km north of the Impact Site. Both the Impact and the Offset Site are situated westerly adjacent to the Flinders highway and Mount Isa railway line.

The land between the impact and the offset site consists of a combination of stock grazing land management systems, alluvial plains, and open woodland eucalyptus forests. The Lansdowne Creek, one of the main permanent waterways discharging into the RRD, meanders adjacent to the impact site(s) and ultimately through the forest

vegetation communities. The Impact and Offset Site are both situated within the larger RRD catchment area, which encompasses an approximate total landmass of 750 km^2.

Therewith, the allocated offset site is suitably situated within proximity of the impact site through landscape connectivity and within the same catchment area (Refer **Figure 1**).

5.1.3 Bioregional and Land Zone

The Offset Site persists within the Brigalow Belt bioregion (11) and is predominantly situated on an alluvium – river and creek flats land zone (3). A relatively small area of *Hills and lowlands on granitic rocks* land zone (12) is mapped within the southern aspect. Land zone 12 is widely represented east to south-east of the Offset Site across the Flinders Highway, starting at the foot of Mount Elliot, Bowling Green Bay National Park.

The offset site suitably features both the same bioregion (12) and land zone (3) as the impact site.

5.1.4 Remnant and Non-Remnant Regional Ecosystems

The offset area comprises a mix of Eucalypt open woodland forests (*Eucalyptus platyphylla*) and grassland communities (*Ophiuros exaltatus, Dichanthium spp.*) generally situated on alluvial plains, with riparian Eucalypt forests (*E. tereticornis and E. camaldulensis*) lining the drainage features across the Offset Site. Within both the northern and southern aspect of the site, hills comprising of generally sparse *E. platyphylla* woodland forest vegetation communities were observed. These areas are spatially mapped containing igneous rock deposits. At the foothills of the northern mount a human induced dam was recorded.

The offset site consists of three RE's also present and prescribed as impacted on the impact Site (refer **Table 10**). Therefore, the compensation of impacted habitat can be suitably achieved through uplift of corresponding regional ecosystem communities.

Table 10. Remnant and Non-remnant Regional Ecosystem Mapping as per Queensland Globe Online Spatial Mapping System.

RE:	Status	Short description	At Impact site
RE 11.3.31	Remnant	Ophiuros exaltatus, Dichanthium spp. grassland on alluvial plains	-
RE 11.3.35	Remnant	Eucalyptus platyphylla, Corymbia clarksoniana woodland on alluvial plains	**Yes**
RE 11.3.35a	Remnant	Corymbia tessellaris, C. clarksoniana and Eucalyptus platyphylla woodland	-
RE 11.3.25b	Remnant	Melaleuca leucadendra and/or M. fluviatilis, Nauclea orientalis open forest	**Yes**
RE 11.12.9	Remnant	Eucalyptus platyphylla woodland on igneous rocks	-
RE 11.3.31	Non-remnant	Ophiuros exaltatus, Dichanthium spp. grassland on alluvial plains	-
RE 11.3.35	Non-remnant	Eucalyptus platyphylla, Corymbia clarksoniana woodland on alluvial plains	**Yes**

5.1.5 Accessibility

The offset site is strategically located along the Flinders Highway, providing direct access via state owned rural roads, such as: Valley Drive north of the Site. In addition, multiple well maintenance tracks provide good accessibility throughout the offset site. Valley Drive at the northern-most aspect, continues parallel to the western boundary as Old Flinders Highway, providing access over old bitumen road. The bitumen road was once built on top of a dike and ends at the centre aspect of the site, where Antill Plains Creek traverses through the centre.

In contrast to the ample access ways and onsite tracks, the combination of the Mount Isa Railway Line on the east and the catchments' wetted margins of Ross River Dam on the southwest, form borders limiting access by the public, through physical barriers.

The site is suitably accessible over multiple unsealed tracks providing possible maintenance ease and cost-effective management opportunities, subject to maintenance of these tracks.

5.1.6 Water Security

In total, the Offset Site survey area consists of five (5) spatially mapped drainage features. All waterways and drainage features flow in a generally southwestern direction, ultimately draining into the Ross River Dam Catchment (RRDC). The RRDC forms the primary water reservoir for water supply and water security to Townsville

City and surrounding suburbs. It is considered a large permanent waterbody and important habitat to both freshwater and terrestrial fauna. Three of the five drainage features consist of permanent waterways: Antill Plains Creek, the Stonehouse Creek and a tributary north of the Antill Plains Creek. Both the Antill Plains Creek and the Stonehouse Creek consisted of significant flow, low to moderate vegetation on the riparian margins and provide a connection between the catchment area on the foothills of Bowling Green Bay National Park, and Ross River Dam.

Both the availability of the RRD and the permanent waterways promote water resource reliant MNES threatened species habitat as well as potential water resources security to facilitate establishment of revegetation planting.

5.1.7 Ecological Connectivity

A mosaic of remnant vegetation provides high connectivity value across the northern boundary and to a lesser degree across the eastern and southern boundaries. Further remnant vegetation is spatially mapped and ground truthed along the Antill Plains Creek waterway on its riparian margins. This vegetation provides corridors and opportunity to promote improved connectivity as an integral part of the greater RRD catchment network.

Further opportunity exists to promote connectivity through the sparse and fragmentated vegetation, as ground truthed within the mapped Remnant Vegetation communities within the northern aspect of the site.

Despite that the Mount Isa Railway and Flinders Highway form permanent physical barriers along the north and eastern boundaries, however a degree of habitat connectivity to avian species, such as the BTF habitat is considered present and intact with vegetation communities on either site bordering the road and railway infrastructure.

On a larger scale, habitat connectivity within the wider landscape is considered opportune for avian species, whilst several vegetation communities functioning as steppingstones provide wider connectivity with Bowling Green Bay National Park, situated on the east, including connection through permanent waterways as part of state and regional biodiversity corridors (refer to Plan 8).

5.1.8 Land Tenure

The allocated offset site survey area consists of a combination of freehold (16), state owned (6) and easement (4) land parcels. The Mount Isa Railway Line (easement) and Flinders Highway for two major easements on the eastern boundary of the offset site survey area. An additional easement runs north to south across the eastern aspect, covering land facilitating a state-owned pipeline connection. Offsets will only be utilised in the freehold land sections. The freehold land is owned by Townsville City Council, and currently managed by its Department for Water Supply and Dams

5.1.9 Historic land uses and disturbance

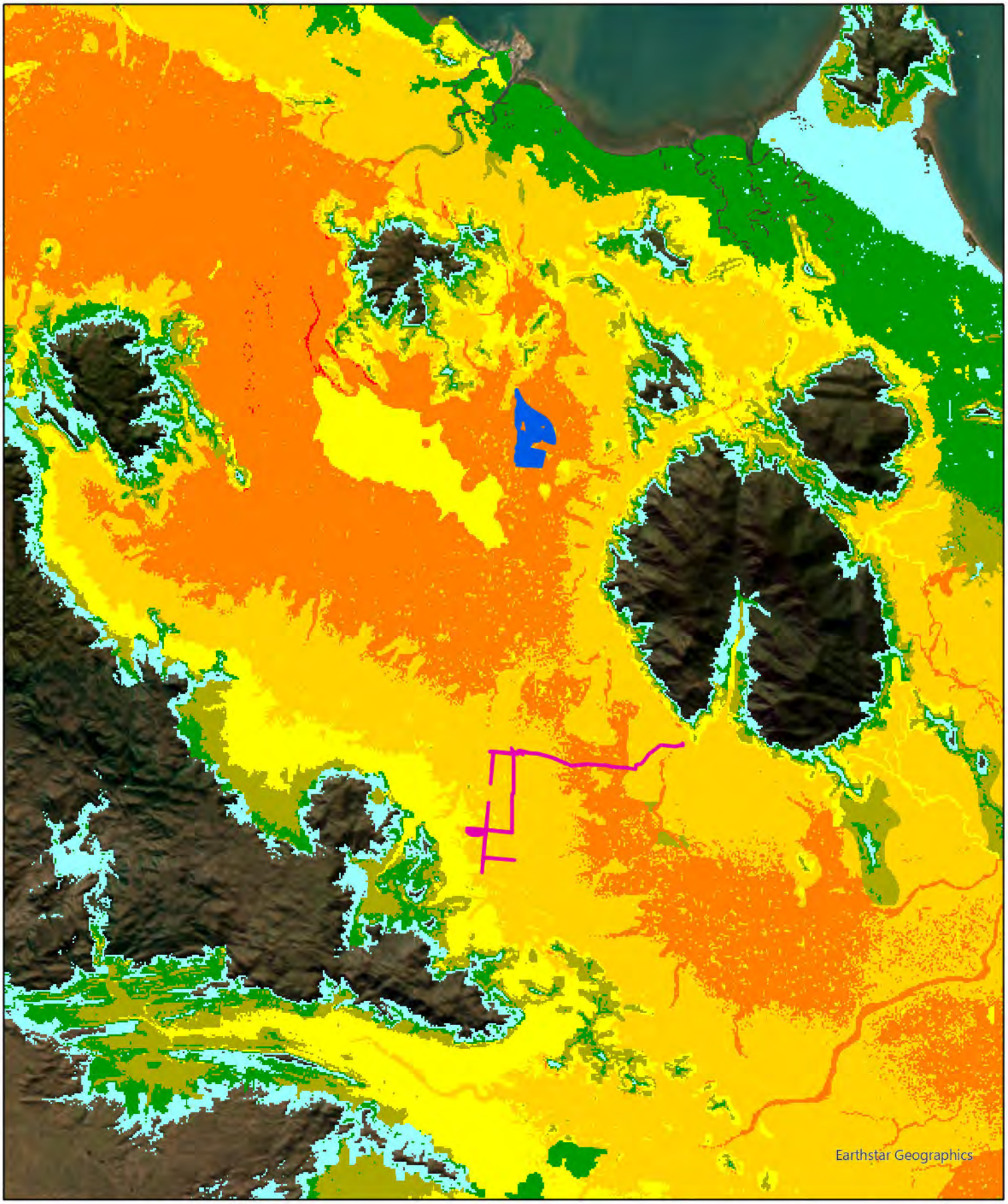
A desktop analysis was undertaken utilising satellite imagery from 2nd of May 1961 to 30th of September 2017, accessed through the online Queensland Government portal: QImagery. The satellite photos indicate that following historic land use practices have changed the landscape and vegetation structure over more than five decades.

- 1961: The offset site was largely vegetated by an open woodland structure, Flinders Highway crosses the site and positioned in what is now Old Flinders Highway. The site is traversed by (likely) the Antill Plains Creek. The RRD did not exist. Agricultural or stock grazing land use systems do not clearly appear to occupy the site.
- 1974: Intensive land disturbance clearly visible, possibly relating to start of the RRD construction process, possibly forcing periodic traffic to avoid Flinders Highway and taking alternative route alongside Mount Isa Railway Line. Clear indications visible of vegetation clearing, allotment and grazing practices on and in proximity to the site.
- 1986: Construction of the 'new' Flinders Highway, a realignment to likely address the future water tables of the RRD catchment areas. The offset site appears to have partially functioned as building site to facilitate construction of the highway realignment.
- 1995: Some regrowth visible down gully landforms. RRD is not nearing the site.
- 2000: Wetted margins of RRD have reached the southwestern boundary of the site.

- 2017: Further land clearing and land use practices degrade the amount of vegetation on and in proximity to the site. Clear indications are visible from intensive farming practices and access to the site.

Large parts of the Offset Site have historically been subject to farming practices and infrastructure developments, including the construction of RRD and the realignment of the Flinders Highway. No clear indicators can be derived from satellite imagery to determine what specific land use practices have shaped the site. However, the imagery provides good insight into where the most intensive clearing (Southern half and the centre off the site bordering Antill Plains Creek - 1995 – 2017) has taken place and where the highest degree of vegetation has been retained (North of the Antill Plains Creek - 1961 - 2017). In addition, ground truthing activities have revealed that the highest degree of exotic plant introduction and exotic plant cover persists within the areas that were subject to the highest degree of vegetation clearing, open grassland areas, which provide ample opportunity for environmental uplift.

In summary, the offset site presents ample of opportunity to provide environmental uplift restoring the environmental damage created through systematic degradation of the land over an approximate 50-year period (1970's to 2020's).



Legend

Impact site footprint

Offset site footprint

Poephila cincta cincta (Southern Black-throated Finch) Likelyhood Of Occurance

Value

0 - 10

10 - 20

20 - 30

30 - 40

40 - 50

50 - 60

60 - 70

70 - 80

80 - 90

90 - 100

0 4 8 Kilometers

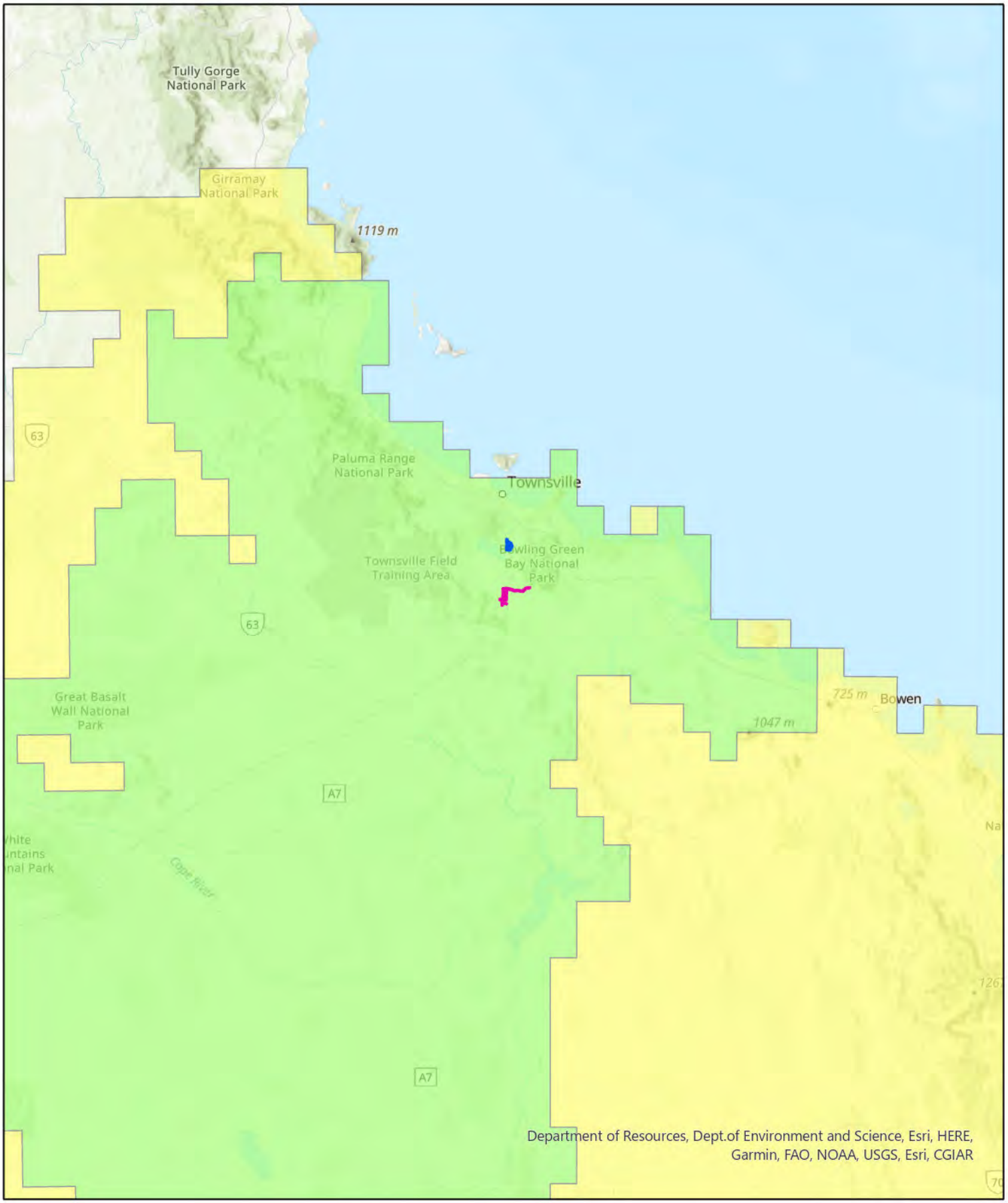
N

Figure 2 BTF Potential Habitat Model
30/08/2023

Figure 2: BTF Potential Habitat Model

EVOLVE environmental solutions

Client: CDM Smith
Address: Landsdown Eco-Industrial Precinct



Legend

- Impact site footprint
- Offset site footprint

Southern Black-throated Finch Distribution

- Species or species habitat likely to occur
- Species or species habitat may occur

0 50 100 Kilometers

N

Figure 3 BTF Species Range
30/08/2023

Figure 3: BTF Distribution

EVOLVE environmental solutions

Client: CDM Smith
Address: Landsdown Eco-Industrial Precinct

5.2 Field Survey Methodology and Results

The field surveys were conducted between 27th of February and the 3rd of March, involving ground truthing of the spatially mapped Remnant and Non-remnant vegetation (Regional Ecosystems), assessment of existing BTF habitat by way of conducting Modified Habitat Quality Assessments, and inventory of general ecological foraging and habitat features, such as: surveying of landscape connectivity, regional ecosystem context, recorded threats present and the availability of water resources through assessment of waterways and drainage features.

5.3 Ecological Methodologies

The survey methodologies applied to determine suitability of the Offset Site and subsequently, to provide a baseline scenario for vegetation communities and BTF habitat quality, are in keeping with the survey methodologies undertaken at the impact site assessment in preparation of the LEIP HQA Report, as outlined in Section 2 of this Report.

As part of the fauna assessment, thirteen (13) wildlife cameras and eleven (11) passive audio recording devices (Anabat and Audiomoth recorders) were deployed. Waterway assessments were undertaken to identify available water resources. In total, seven (7) waterway locations were assessed within the offset site during the survey period. Refer to **Plan 1** for locations of these assessments.

5.3.1 BTF Survey Effort

Land-based and targeted searches were conducted over the course of the survey period (across all five survey days), totaling **12 hours of land-based searches and 9 hours of targeted searches**, during various periods of the day: dawn surveying, diurnal surveying and surveys undertaken at dusk.

5.3.2 Survey Timing

The field surveys pertaining to the offset site area were conducted over a five day and four-night period. The weather conditions for the assessment dates recorded at the Defence Force weather station of Mount Stuart (station 032195) - approximately 7 km northwest of the site, are provided below in **Table 11**.

Table 11. Weather conditions during site surveys (Source: www.bom.gov.au)

Date	Day	Min Temp (°C)	Max Temp (°C)	Relative Humidity (9am)	Wind speed (9am)	Rainfall (mm)
27/02/2023	Monday	23.2	30.9	80%	6	0
28/02/2023	Tuesday	23.1	32.8	76%	4	0
01/03/2023	Wednesday	22.1	32.9	71%	4	0
02/03/2023	Thursday	22.9	32.9	73%	6	0
03/03/2023	Friday	23.8	33.2	76%	4	0

In keeping with the standards of the BioCondition benchmarks, the appropriate amount of BioConditions were undertaken and adequate fauna assessment equipment was deployed in order to conduct fauna recordings and habitat quality assessments.

5.3.3 Camera Trapping

Thirteen (13) motion sensor cameras were deployed for four (4) nights during the survey week. The following methodology was employed during the camera trapping surveys:

- Cameras were installed in key locations on site;
- Cameras securely attached 10 – 50 cm from the ground on a tree or post;
- Cameras were not baited; and
- Cameras were set on the burst function of 3 photos per trigger.

5.3.4 Anabat passive detectors and Audiomoths

Four (4) Anabat and seven (7) Audiomoth devices were similarly deployed over 3-4 nights in key locations where bats were previously observed or where potential roosting habitat in the form of tree hollows and shedding bark was recorded. Audio recordings were taken for the duration of each night over the time they were deployed,

volume and frequency thresholds were set to reduce non-bat recording, volume was set in-situ based on background noise, Frequency was set to 12000 KHz as the target species have calls above this frequency. Data was analysed by spectrograph using the Anabat Insight program and compared to calls of species which have a range coinciding with the site.

5.3.5 Survey Equipment Specifications

Survey equipment specifications are provided below in **Table 12**.

Table 12. Survey equipment specifications for the devices utilised in-field.

Device Type	Unit Type	Unit Specifications
GPS (2x)	Arrow 100 Submeter GNSS Receiver	• Multi-constellation GNSS receiver that utilises differential corrections to achieve sub meter accuracy.
Camera trap (13x)	Infrared Motion sensing cameras	• Trigger distance up to 23m when at temperatures below 25°C, full field of view trigger distance at temperatures between 25oC and 60oC • 70°PIR sensor detect wide and night vision up to 23m • Trigger time in 0.3 second
Audiomoth (7x)	Audiomoth 1.2.0	• 6.0 kHz minimum recording frequency • Recording period from 1830 to 0600 • Cyclic sampling cycle of 1 minute recording per half hour. • Using Firmware version 1.8.1
Anabat (4x)	Anabat Swift Passive Detector	• Full Spectrum and Zero Crossing Recording • Built-in GPS for site location, transect mode, setting the clock, and calculating sunset and sunrise times for automatic night recording • Records temperature and battery voltage

5.3.6 New Benchmark Caveat for 11.3.31 Remnant and Non Remnant

Due to no available BioCondition benchmarks for RE 11.3.31 remnant and non-remnant vegetation, a benchmark was populated based on recorded vegetation conditions and optimal conditions of BTF habitat requirements for this RE. As following habitat attributes are commonly not occurring in accordance with the Technical Description of this RE, their value (scoring) was excluded from the benchmark parameters:

- Recruitment of woody perennial species in EDL;
- Native plant species richness – shrubs;
- Shrub canopy cover; and
- Coarse woody debris.

The total scoring potential for the RE was appropriately adjusted the total available scoring. The new benchmark is populated as per **Table 13**.

Table 13. Populated Benchmark for 11.3.31

Habitat attribute	Benchmark for RE 11.3.31	Max scoring
Recruitment of woody perennial species in EDL	0	**Excluded**
Native plant species richness - trees	3	5
Native plant species richness - shrubs	0	**Excluded**
Native plant species richness - grasses	6	5
Native plant species richness - forbs	7	5
Tree canopy height (average of emergent, canopy, sub-canopy)	14	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	10	5
Shrub canopy cover	0	**Excluded**
Native Perennial grass cover	77	5
Organic litter	12	5
Large trees (euc plus non-euc)	1	15
Coarse woody debris	0	**Excluded**

Non-native plant cover	0	10

The populated benchmark of **Table 13** has been applied to both remnant and non-remnant vegetation (RE11.3.31) within the offset site survey area habitat assessment calculations.

Plan 4. Habitat Quality Assessment Locations

Legend

- BioCondition Transects
- Site Boundary
- Track Logs
- BTF Sighting

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	19/04/2023	Preliminary	RH	AH

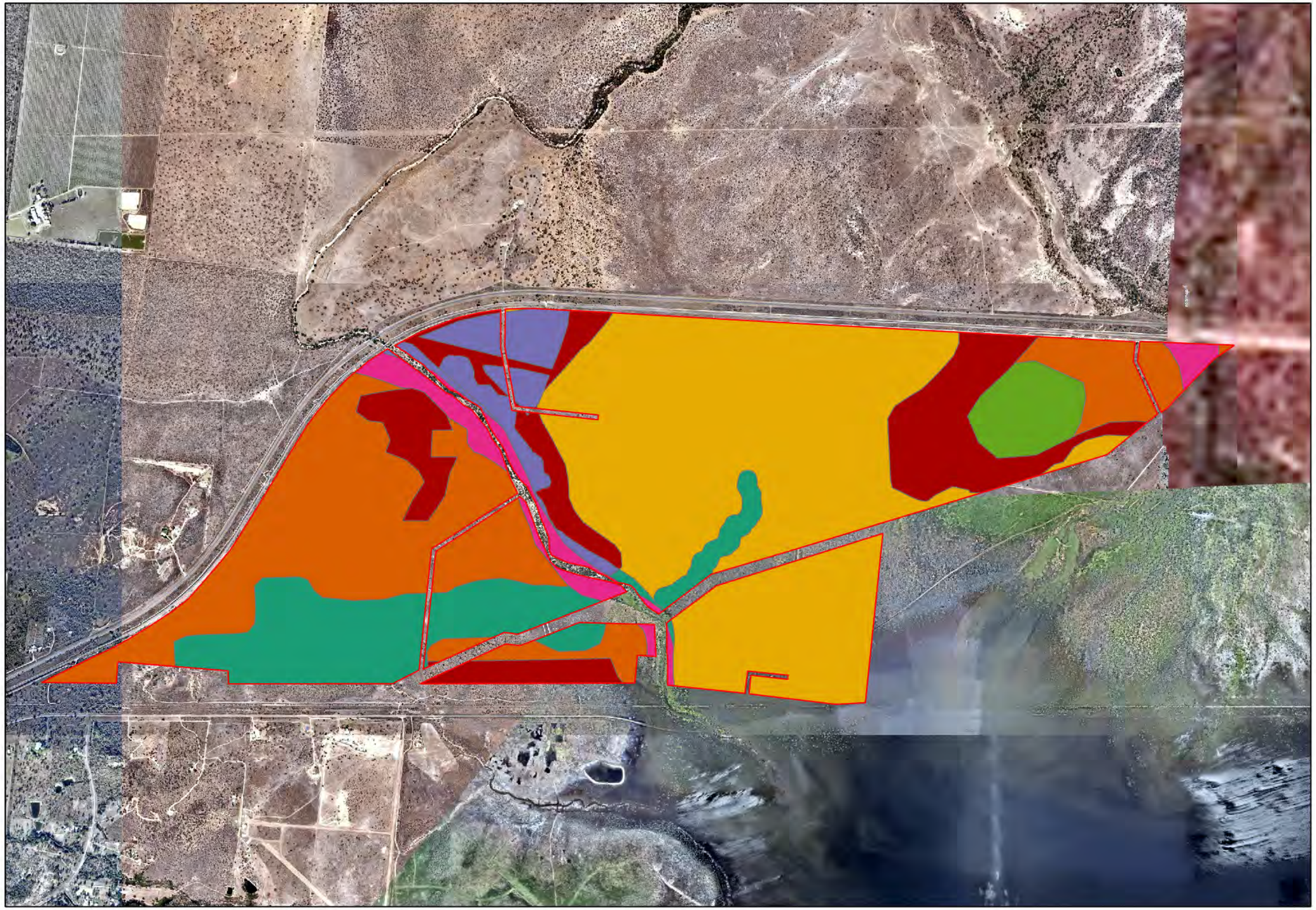
0 125 250 500 750 1,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 19/04/2023
Offset Site Analysis

Plan 5. Assessment Units



Legend

Offset Investigation Area

Assessment Units

- AU1
- AU2
- AU3
- AU4
- AU5
- AU6
- AU7

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	19/04/2023	Preliminary	RH	AH

0 125 250 500 750 1,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 19/04/2023
Offset Site Analysis

5.4 Offset Site Field Survey Results

Twenty-nine (29) Modified Habitat Quality Assessment (MHQA) transects were conducted within the nominated offset survey area (Refer **Plan 4**). Modified Habitat Quality Assessment data was recorded within these same transects covering a total of 7 Assessment Units (refer **Plan 5**). This Section provides a summary of the MHQA results and findings.

For the purposes of the Modified Habitat Quality Assessment, the assessment units were defined based upon Regional Ecosystem and Vegetation Status (Remnant or Non-remnant) (Refer **Table 14**).

Table 14. Assessment Units for the Modified Habitat Quality Assessment

Assessment Unit	RE	Status	Sample Units	Area (ha)
AU1	RE 11.3.31	Remnant	H4, H5, H6, K3, Z12	113.6
AU2	RE 11.3.35	Remnant	Z1, Z2 ,Z3 ,Z4 ,Z5, Z6, Z7	160.7
AU3	RE 11.3.35a	Remnant	Z8, Z9	34.5
AU4	RE 11.3.25b	Remnant	H7, H8	34.5
AU5	RE 11.12.9	Remnant	H1, H2, H3	24.2
AU6	RE 11.3.31	Non-remnant	H9, H11, H12, H13, K1, K2, Z10, Z11, Z13	312.9
AU7	RE 11.3.35	Non-remnant	H10	86.6

It should be noted that only the sample units needed to meet the requirements of the offset will be discussed in this OMP.

5.4.1 Baseline and Ground Truthing Survey Results

MHQA scores at the offset site were **intermediate** ranging from **6.69** to **6.90** out of 10, across the assessment units.

Two Regional Ecosystems occur in large patches across the offset site in both remnant and non-remnant forms: RE 11.3.31 and RE 11.3.35. Overall, the condition of the remnant vegetation of these RE's scored higher in BioCondition results than the non-remnant equivalent.

RE 11.3.31, which covers the largest extent of non-remnant vegetation mapping and the single-largest extent of remnant vegetation mapping within the offset site, scored the highest in habitat quality across all AU's, respectively scoring **6.82** (AU6) and **6.90** (AU1).

RE 11.3.35, consisting of the largest remnant vegetation cover (AU2) within the offset site, scored **6.83**, which is considered slightly above average across the board.

Refer to **Appendix A** for the MHQA assessment unit breakdown.

5.4.2 Habitat Scores for the Southern Black Throated Finch

Habitat quality scores for the avian species were measured through site context analysis, BioCondition scores, and Species Stocking Rate (SSR). The site context analysis involved assessment of following criteria: size of patch, connectedness, context, ecological corridors, role of site location to species overall population in the state, threats to the species, and the species related mobility capacity across the site. As an avian species, these criteria were assessed and scored from a conservative, sitewide approach, assessing and scoring each attribute on the presence or prevalence within the larger context of, and within the offset site itself. Therefore, the habitat scored maximum on *Size of Patch*, *Connectedness*, *Context*, *Ecological Corridor*, and *Role of Site location* scored maximum on habitat value for both impact and offset site.

Data was collected during BioConditions and at random across and adjacent to the offset site during the survey period. A summary of scores for each criteria of the habitat quality for Southern Black Throated Finch are presented in **Table 15**.

Table 15. Habitat quality assessments of the Southern Black Throated Finch at the Offset Site - summarised by assessment unit.

Assessment Unit	AU1	AU2	AU3	AU4	AU6
Regional Ecosystem	Remnant 11.3.30	Non-remnant 11.3.30	Remnant 11.3.35	Non-remnant 11.3.35	Remnant 11.3.27e
Foraging Habitat					
Abundance of preferable grass species	14	12.1	5	7.5	15
Species richness of preferable food grasses	11	12.1	5	5	11.67
Mosaic of bare ground and grass cover	9	11.4	12.5	10	11.11
Average Score	11.3	11.9	7.5	7.5	12.6
Shelter Habitat					
Nesting tree availability	7	11.25	12.5	10	7.77
Distance to water	24	18.75	20	25	15
Average Score	15.5	15.4	16.3	17.5	11.4
Role of site to overall population	5	5	5	5	5
Threats					
Reduction In water availability	25	25	25	25	25
Intensive grazing regimes	25	25	25	25	25
Risk of fire	18	17.85	20	15	18.33
Exotic weed dominance	11	10.71	10	10	8.88
Average Score	19.8	19.6	20	18.8	19.3
Species Mobility					
Coverage of shrub species, including native and introduced species	24	23.57	22.5	20	25
Prescence of open grassy woodland vegetation structure	13	13.57	12.5	15	12.22
Average Score	18.5	18.6	17.5	17.5	18.6

* While Threats to Species and Species Mobility Capacity were initially scored out of 25 as seen in this table, this was proportioned to a score out of 15 and 10 respectively to be in line with the federal modified habitat quality assessment template

5.4.2.1 Foraging Habitat Scores

Average foraging habitat scores for each assessment unit varied from low to intermediate results, ranging from 7.5 to 12.6 out of 25. A lack mosaic of bare ground and seed source grass cover was measured across the offset site. A dominance of exotic pasture species was recorded across the AUs resulting in these low to intermediate foraging habitat scores.

5.4.2.2 Shelter Habitat Scores

Average shelter habitat scores for each assessment unit scored generally intermediate to high, with scores ranging from 11.4 to 17.5. Permanent water availability was generally high due to a number of dams, the RRD and permanent and intermittent waterways evenly spread across the surrounding landscape.

5.4.2.3 Species Mobility Scores

Average species mobility scores were generally high, from 17.5 to 18.6. Where the species mobility was considered affected, it was largely due to the presence of exotic shrub cover, and to some extent due to the presence of permanent infrastructure along the eastern aspect of the site.

5.4.2.4 Species Stocking Rate

The Southern Black Throated Finch was allocated a Species Stocking Rate (SRR) of 55 out of 70 for the site, which results in a SSR habitat score of **3.14**. Scoring is shown in **Table 16.**

Table 16. Species stocking rate calculation for the Southern Black Throated Finch

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		**10**	
		No	Yes - adjacent		Yes - on site	
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	**15**	
		Not habitat	Dispersal	Foraging	Breeding	
Approximate density (per ha)	Score	0	10	**20**	30	
Role/importance of species population on site*	Score	0	5	**10**		15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)		**55**				
SRR Score (out of 4)		**3.14**				

*Highlighted red text shows calculation pathway

5.4.3 Field Survey Recordings of BTF presence

Land-based and targeted searches resulted in one positive recording (sighting) of the BTF and several nesting features and hollows that met the criteria for potential nesting sites. The BTF sighting occurred on the western aspects, in the non-remnant grassland vegetation of AU6 on the border of the RRD. The Southern Black-Throated Finch was identified and recorded on Thursday morning the 2nd of March (day 4 of the survey period). Refer to **Plan 4** for the sighting location.

5.5 Offset Site Values (MHQA)

The MHQA has provided the following important findings regarding the quality of BTF habitat and breeding ground on the offset site:

- A dominance of exotic grasses in the understorey, prevents native preferable food grasses to establish and prevail, resulting in reduced foraging availability.
- A widespread dominance of exotic grasses in open land and a consistent prevalence of exotic grasses in the understorey vegetation, results in little to no areas of bare ground. This factor limits the BTF from accessing seed sources in the groundcover layer.
- The dominance of exotic grasses in the understorey also prevents recruitment of preferable nesting tree species, which is represented in the assessment results through the low habitat scoring of canopy cover amongst the largest two RE assessment units: the 11.3.31 non-remnant and 11.3.35 remnant vegetation communities, respectively AU6 and AU2.
- The presence of invasive tall exotic shrubs, such as Chinee apple, impedes on BTF mobility across the landscape within the offset site.
- The Site Context is considered of high value, while it is assumed that the BTF as an avian species, can freely navigate across remnant and non-remnant vegetation within, and adjacent to, the offset site. Therefore, it is considered that the Mount Isa Railway line and the Flinders Highway form little physical obstruction or threat to the BTF. In addition, across the road and railway infrastructure and on the remaining perimeter of the offset site, the landscape is of rural nature, with large connected vegetation communities, permanent water resources and unconstrained passage through ecological corridors present.
- Through the presence of permanent water resources, the offset site provides for ample resources of water security within a maximum 2,500 m distance from anywhere within the offset site. Most remnant vegetation is situated within closer proximity to water resources (max 1,500m).
- Due to the offset site location, situated within the RRD catchment area, water resource permanence is considered a consistent habitat value.
- Through historic clearing activities, the canopy cover is considered either absent, sparse or (heavily) degraded.

- Intact infrastructure surrounding the site, a sealed access road north of the site and multiple maintenance tracks existing throughout the site provide for a high degree of mobility to maintenance and restoration professionals across the site.

Table 17 provides an overview of Relevant Assessment Units allocated for offsetting area and their Habitat Scoring for the BTF.

Table 17. Overview of Relevant Assessment Units allocated for offsetting area and their Habitat Scoring for the BTF.

Offset Management Zones	**OMZ-1**				**OMZ-2**		**OMZ-3**	
Final habitat quality score (weighted)	**AU2**	**AU3**	**AU4**	**Average/Final**	**AU1**	**Average/Final**	**AU6**	**Average/Final**
Site Condition score (out of 3)	1.28	1.24	1.14	1.22	1.35	1.35	1.27	1.27
Site Context Score (out of 3)	2.41	2.41	2.41	2.41	2.41	2.41	2.41	2.41
Species Stocking Rate Score (out of 4)	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Habitat Quality score (out of 10)	6.83	6.79	6.69	6.77	6.90	6.90	6.82	6.82
Assessment Unit area (ha)	149.1	34.3	21.8	205.2	72.0	72.0	95.0	95.0
Total area (ha) of associated OMZ	205.2	205.2	205.2	205.2	72.0	72.0	95.0	95.0
Size Weighting	0.727	0.167	0.106	1.0	1.00	1.0	1.0	1.0
Weighted Habitat Quality Score	4.96	1.13	0.71	**6.81**	6.90	**6.90**	6.82	**6.82**

Plans 6, 7 and 8 further illustrate the impact site scoring on size patch, connectedness, habitat context and ecological corridors. Refer to **Appendix A** for detailed habitat quality scoring calculations.

Plan 6. BTF Habitat Patch Size & Connectedness

Legend

- Potential BTF Habitat
- Site Boundary

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	14/04/2023	Preliminary	RH	AH

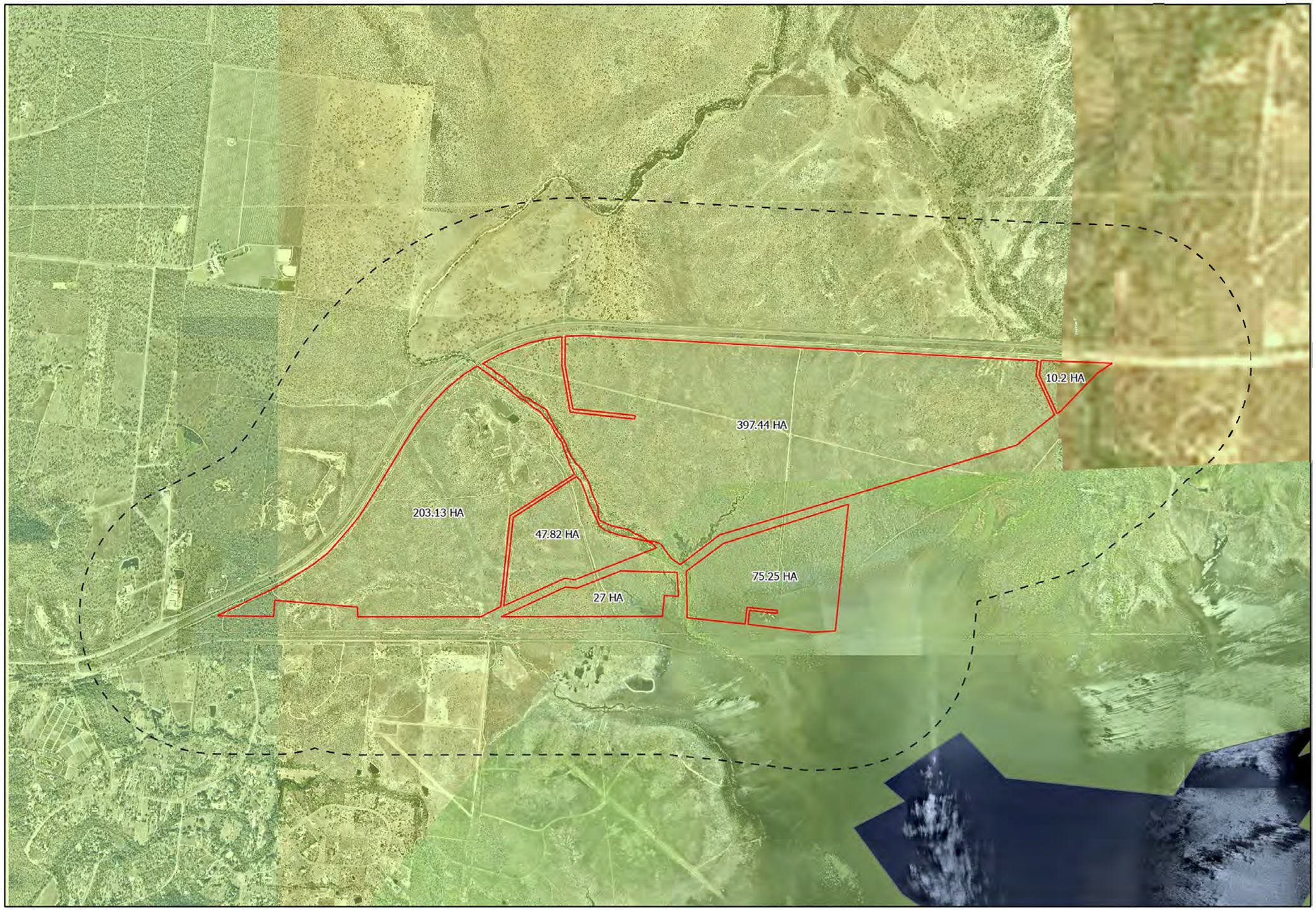
0 125 250 500 750 1,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 14/04/2023
Offset Site Analysis

Plan 7. BTF Habitat Context



Legend

- Potential BTF Habitat
- Site Boundary
- 1km Site Buffer (100% BTF Habitat)

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	14/04/2023	Preliminary	RH	AH

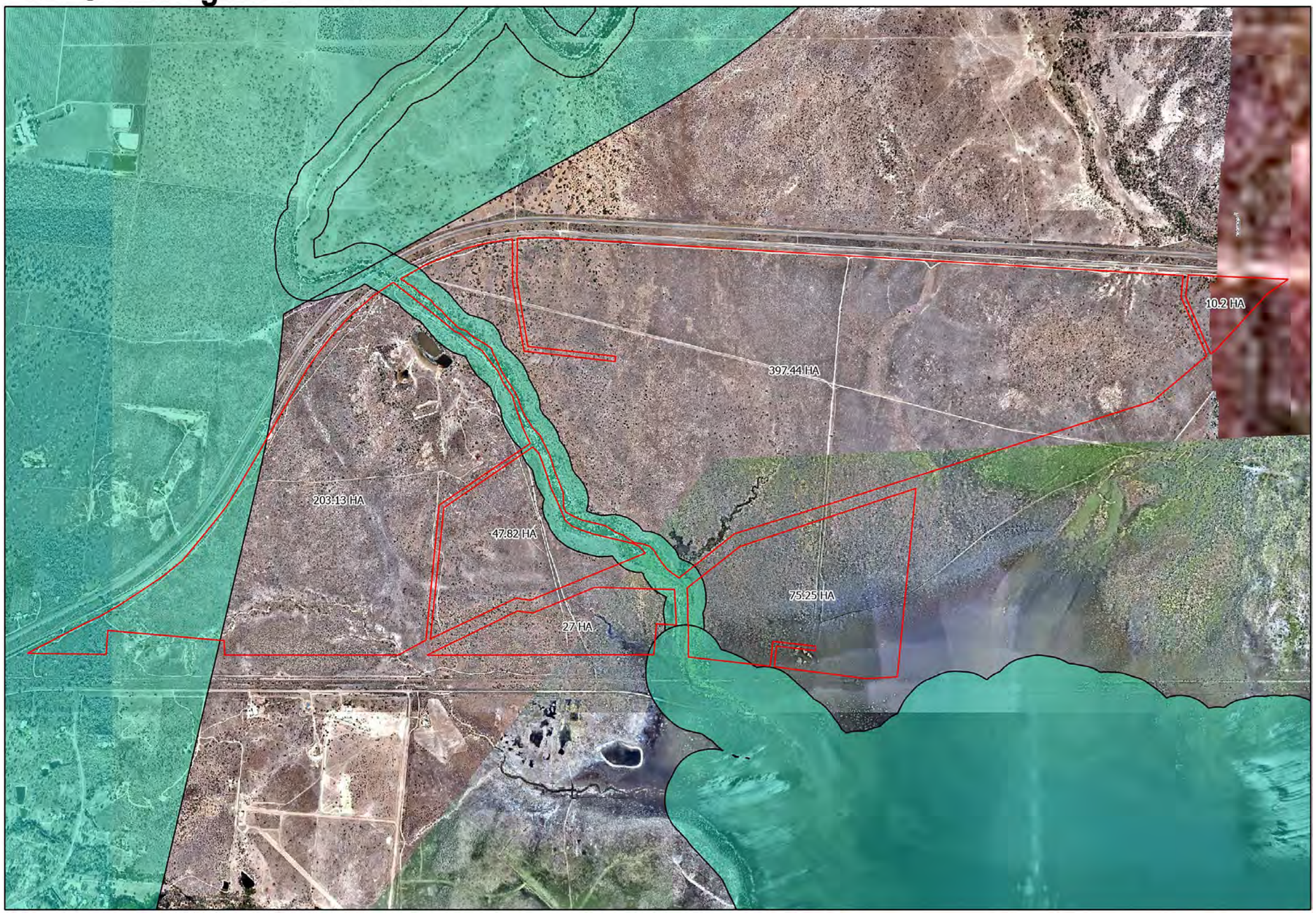
0 180 360 720 1,080 1,440 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 14/04/2023
Offset Site Analysis

Plan 8. Ecological Corridors



Legend

- Site Boundary
- Statewide Ecological Corridors

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	14/04/2023	Preliminary	RH	AH

0 125 250 500 750 1,000 m

Coordinate System: GCS WGS 1984

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 14/04/2023
Offset Site Analysis

6 Offset Site

6.1 Suitable Area for Offsetting

Based on the results of both desktop and field assessments, the northern half of the site, inclusive of the riparian margins and parts of remnant and non-remnant vegetation just south of the Antill Plains Creek, are considered most suitable for offsetting of impacted BTF habitat (Refer to **Plan 9**).

All available freehold land parcels, and a portion of some freehold land parcels are considered for environmental uplift as part of the offset strategy while providing suitable land for revegetation planting and improved connectivity. State-owned land and easements have been avoided for legal title securing and revegetation feasibility reasons.

Furthermore, RE 13.3.31 remnant and non-remnant vegetation following a drainage channel, and the borders south of the Antill Plains Creek is allocated for offset to achieve the required land-based extent and to provide connectivity to the RRD waterbody (Refer **Plan 9**).

6.1.1 Selection of Offset Areas

Twelve (12) freehold lots considered suitable for (partial) offsetting, are tabulated below (refer **Table 18**). Additionally, Five (5) state-owned land parcels are situated alongside or between the freehold land parcels, and provide, subject to legal approval, access for offset management and maintenance purposes. The selected area for offsetting encompasses **372.2 ha** of land across 3 specifically selected Offset Management Zones. **Table 18** below presents total extent of proposed lots (to be utilised for offsetting), not the partial extent within some of the lots allocated for the proposed offset, such as Lot 6 on EP68.

Table 18. Selection and partial selection of land parcels for Offsetting of SRI on impacted BTF habitat.

No.	Lot	Plan	Lot area (m^2)	Lot area (ha)	Tenure	LAT	LONG
1	270	K124783	323750	32.4	Freehold	-19.44213175	146.8420934
2	1	RP730813	196490	9.8	Freehold	-19.43848483	146.8540849
3	1	RP730816	135300	13.5	Freehold	-19.423368	146.8400095
4	1	RP730817	18140	1.8	Freehold	-19.41939052	146.8380765
5	1	RP731185	2320440	232.0	Freehold	-19.44265356	146.8389464
6	1	RP731185			Freehold	-19.43900596	146.8392662
7	1	RP731185			Freehold	-19.44048153	146.8453176
8	1	RP731185			Freehold	-19.43374377	146.8460386
9	3	RP730815	288100	28.8	Freehold	-19.44360049	146.8539791
10	21	RP703022	369880	37.0	Freehold	-19.45221738	146.8403142
11	6	EP68	942920	94.3	Freehold	-19.44627939	146.8462941
	2	RP730812	1438000	143.8	Freehold	-19.45458678	146.85186778
Total Freehold land			6033020	603.3			
A	11	SP313051	915890	91.6	State Land	-19.44378588	146.8375333
B	11	SP313051			State Land	-19.44278363	146.839737
C	11	SP313051			State Land	-19.42913507	146.841666
D	T	SP175324	16690	1.7	State Land	-19.43858085	146.8544585
E	7	SP313047	277505	27.8	State Land	-19.44323275	146.8538535
Total State-owned land			1210085	121.0			

Plan 9. Offset Management Zones

Legend

Management Zones

Name

- MZ1 (205.2 HA)
- MZ2 (73 HA)
- MZ3 (95 HA)
- Offset Investigation Area

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	29/08/2023	Preliminary	RH	AH

0 125 250 500 750 1,000 m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 29/08/2023
Offset Site Analysis

6.2 Suitability for Offset Management

In addition to representativeness of existing vegetation communities regarding both the condition as well as the matching RE's, further suitability criteria for offsetting of prescribed SRI are involved:

- the degree of mobility across the site,
- the availability of water resources and water tables in the soil, and
- the manageable presence of existing threats to habitat quality and the livelihood of the BTF itself.

6.2.1 Offset Site Accessibility and Mobility

Both accessibility and mobility across most of the proposed offset area is considered favourable over southern aspects within the offset site survey area. Access over Valley Drive at the north, which continues as Old Flinders Highway over an old, elevated bitumen sealed road provides year around access to the areas north of the Antill Plains Creek.

6.2.2 Soil Saturation and Water Tables

An alluvial plain, situated across (east to west) the centre of the site, south of the Antill Plains Creek, recorded saturated soil conditions during the field surveys. These areas are for both practical offset management and plant establishment purposes deemed ideal for revegetation, and therefore, depicted these areas as suitable for offsetting.

6.2.3 Existing Threats to the BTF at the Offset Site

The higher degree of exotic plant cover within the lower segments of the alluvial plains and the lower degree of contiguous existing native remnant vegetation throughout the southern half, are deemed unfavourable for offsetting. Therefore, the southern half is excluded from the survey area for proposed offsetting activities. To improve connectivity and rapidly establish contiguous native forest communities, a certain degree of existing remnant vegetation cover is considered essential. The higher degree of existing fragmentated habitat cover in the northern half is considered better suitable to facilitate this process of ecological restoration.

6.3 Suitability to Matters for Offsetting

The depicted area for offsetting within the northern half of the offset survey site provided following suitable conditions to facilitate offset of impacted BTF habitat.

6.3.1 Site Context (bioregion and land zones)

In keeping with the impact site, the site context scoring is high (2.41 out of 3), due to:

- The presence of connecting significant habitat, directly and indirectly;
- Size of the offset site and the degree of assessed remnant vegetation within;
- State level mapped ecological corridors persist across the northern aspect of the site as well as overlay a portion of the south-western aspect. On a physical level, ecological corridors within the offset site consist of riparian vegetation alongside permanent waterway and the grasslands following the lowest sections of alluvial plains;
- The role of the BTF is scoring maximum as both the impact and offset site are situated within prime regional habitat;
- Both Threats to, and the mobility capacity of, the BTF are considered restricting or diminishing factors to its habitat quality scoring. The Mount Isa Railway and the Flinders Highway form the main threats to bird strike and SSR. The presence of tall, dense and widespread exotic shrubs, such as Chinee apple, are considered the main factor for obstructed mobility capacity.

6.3.2 Proximity to Impact Site

The offset site is situated within close proximity (<20km) of the impact site and indirectly connected through remnant vegetation and within the same RRD catchment.

6.3.3 Existing remnant and non-remnant vegetation (RE's)

Both RE 11.3.35 and 13.3.25b are represented on impact and offset site and therefore allocated for offsetting. Direct compensation through offsetting of prescribed SRI on habitat in matching RE classifications is considered beneficial.

6.3.4 Recorded Presence of BTF at the Offset Site

The area where a southern Black-Throated Finch has been recorded within the survey areas has been included. The presence itself underpins that the offset site is utilised by BTF as habitat.

6.4 Offset Site Management Zones

To facilitate measurable offset activities, the allocated offset area (**Plan 9**) has been divided into three Offset Management Zones:

- OMZ-1: Consisting of Remnant RE's: 11.3.35 / 35a and 11.3.25b (AU2, AU3 and AU4)
- OMZ-2: Consisting of Remnant RE: 11.3.31 (AU1)
- OMZ-3: Consisting of Non-remnant REs: 11.3.31 (AU6)

Each OMZ encompasses one or more land parcels, consisting of shared ecological features, habitat attributes, RE's and environmental conditions. The purpose of the OMZ's is to bundle offset management actions and apply these to a particular geographical area, representing the MHQA baseline scores evenly across its extent and allowing consistent measuring of offset management activities and progress.

Further considerations that were made regarding the depiction of Offset Management Zones, are:

- Representativeness of the mapped RE and appropriate uplift potential;
- Accessibility to OMZ via existing maintenance and farm tracks;
- Suitability to weed management and revegetation activities;
- Suitability of existing vegetation composition:
    - Suitable areas providing intact fragments of the RE with considerable canopy cover and suitable area for infill planting
    - Suitable growing conditions, such as free draining soil, no rock or heavily saturated land
    - Opportunity to improve vegetation connectivity
    - Existing fencing and proximity to water resources
- Providing one contiguous offset management area, suitable to proposed offset activities;
- Proximity to permanent water resources for both BTF habitat quality requirements and offset management purposes; and
- Land tenure and feasibility to secure land for a minimum 20 year offset period.

6.4.1 OMZ-1:

OMZ-1 provides for the largest offset management zone encompassing three remnant vegetation groups: 11.3.35, 11.3.35a and 11.3.25b. The total extent of this OMZ is **205.2 ha** and consists of open woodland vegetation groups and riparian vegetation segments along the Antill Plains Creek. This OMZ combines the areas consisting of the highest tree densities within the site. The areas are largely contiguous and where separation persists, it is through easements or State-owned land.

This regional ecosystem is noted as providing a sparse woodland structure. Whilst the management for all OMZ's will get similar this OMZ will require higher density planting or assisted re-generation to meet the Woodland description. These densities and the actions that are to be undertaken are located in Section 8 of this report.

6.4.2 OMZ-2:

The OMZ-2 is **72 ha** in area, running across (north to south of) the Antill Plains Creek. The OMZ is generally consisting of open grassland with some degree of riparian vegetation and includes areas of fragmented forest segments. OMZ-2 spans across permanent water resources.

The target for OMZ-2 is to provide uplift within RE 11.3.31 alluvial remnant vegetation, ensuring connectivity between several patches with OMZ-1 and across several drainage features (permanent and intermittent). Several management actions have been described to achieve this target and are located in Section 8 of this report.

6.4.3 OMZ-3:

OMZ-3 is depicted to provide increased connectivity with the RRD catchment while utilising some of the higher scoring grassland habitat segments where BTF was sighted during the survey period.

The target for this management zone is to facilitate improved connectedness, and provide increased foraging habitat values. OMZ 3 will continue as a wide area alongside the southern banks of the Antill Plains Creek and encompass an area of **95.0 ha.** Several management actions have been described to achieve this target and are located in Section 8 of this report.

7 Offset Site Future Values

7.1 Offset Site – Future Scoring Without an Offset

Analysis of historic land use and environmental disturbance at the offset site has provided indication that post development of the Flinders Highway realignment, the vegetation composition has gradually degraded over time.

Under the current RRD weed management regime, as a result of inadequate management capacity to attend and maintain the site, it is expected that due to ongoing competition of invasive exotic grass species and environmental weeds, such as Chinee apple (*Ziziphus mauritiana*), further gradual degradation of habitat quality within the offset site will occur. Although the current pest animal management regime is considered to be effective with regards to the threat opposed by some pest animal species, the overall RRD catchment area is considered too large for the RRD operational management team to adequately control both the spread of invasive exotic plant species and the presence of pest animals. Recordings of wild pigs and a low degree of deer entrance substantiates this.

The habitat quality score of the offset site under its current management regime are scored:

- OMZ-1: **6.81**
- OMZ-2: **6.90**
- OMZ-3: **6.82**

It is expected that through increased exotic vegetation dominance, ongoing pressures from pest animals and land development activities upstream, the habitat quality scoring for the BTF would decrease with one (1) full point over a period of 20 years' time.

7.2 Offset Site – Management Gains through an Offset

To offset the 77.78 ha of the prescribed impact on BTF food and foraging habitat, and shelter and breeding ground, this section will set out proposed offset management actions applying to carefully selected OMZ's and their proportionate effect in achieving a net environmental gain. To illustrate this, several tables and appendices have been provided to show how raw, adjusted and net environmental gain is achieved and what extent of land based offset area is required. In conclusion, this section will justify the offset management actions and parameters applying a conservative management forecast approach (Refer to appendices for data and calculations).

7.3 Measuring Offset Benefits Using the EPBC Calculator Methodology

To determine whether the proposed offset sites are of a proportionate size and scale to account for the loss (total quantum of impact – impact area x impact condition) of these values elsewhere in the landscape, the Commonwealth's EPBC calculator methodology was applied in this instance to help measure offset benefits against each associated impact site (Refer **Appendix B** for use of the offset calculator for OMZ1, OMZ2, and OMZ3).

This was done using a habitat quality score of **6.77 out of 10** for the impact site, combined with actual current baseline scores from each proposed offset management zone and estimated future gains based on proposed management intervention at the offset site over the prescribed 20-year offset management timeframe.

7.4 Additionality

The current vegetation and pest animal management activities at the offset site are undertaken by the RRD Management group. Its' on-ground land management team consists at each time of operation of a maximum two personnel and is assigned with the weed and pest animal management of an extensive catchment area. The catchment spans an approximate 760 km^2 and the focus areas of the RRD management team follows the entire perimeter of the dam.

Due to the fact that a small maintenance crew is tasked with the land management activities of such a vast area, it is believed that its management activities is unlikely to be effective or adequate. In particular, the frequency at which the maintenance crew can attend the site is considered to be inadequate to the sites' conditions and requirements.

The weed incursions and infestations recorded at the offset site provide evidence of unmanaged vegetation areas or long term regrowth of exotic species. The condition of access tracks across the access site provide further indication lacking maintenance capacity to adequately provide environmental management or uplift at the offset site under its current maintenance regime. The RRD management group substantiated these observations and acknowledged the unmanageable task of providing effective weed and pest animal management.

Due to its ineffectiveness, the current vegetation management activities are believed to sustain the ongoing degradation of the vegetation quality at the site. The fourth and fifth column of **Table 28**, respectively the Priority Outcomes/Objectives and the Performance Indicators, provide insight into additionality of the proposed management activities in comparison to the existing vegetation and habitat quality, which is subject to the current RRD vegetation management regime.

The MHQA results of the offset site evidently show that existing management actions that have been applied to the site prior to the survey period, have little to no effect. The proposed offset management actions and their associated frequencies as tabulated in respectively column three and column seven of **Table 28**, are designed to provide distinctive, additional, and site focused environmental gain in accordance with proven and recommended vegetation management methodologies.

8 Offset Management Actions

The BTF habitat offset will achieve a conservation outcome for the impacted matter by improving both nesting and foraging habitat for the impacted species. This will be achieved by reconstructive planting, and through management of the identified threatening processes, such as bushfire, invasive exotic plants, pest animals and entrance by the public. Furthermore, the ongoing progress and safeguarding of the offset management actions will be assured through legal protection of the offset site, to constrain any land use or development activities that could impede on the offset activities. To achieve the conservation outcome, a particular emphasis will be applied to weed and pest eradication preceding the reconstructive planting activities, and control of the pest animal and plant pressures thereafter.

8.1 Management Approach

The offset will be located within the same local government area as the impact and will be delivered entirely as a land-based offset. The conservation outcome is expected to be achieved within 20 years of commencement of the management actions detailed in this report.

This section outlines the following management actions within **Table 28**:

- Preparation, re-instatement of access tracks and maintenance;
- Installation of Fauna friendly stock-exclusion fencing and maintained thereof;
- Management of exotic grass species;
- Management of Chinee Apple infestation;
- Reconstruction planting of RE appropriate species;
- Implementing a watering and fertilising regime;
- Bushfire Management through planned low-intensity burning; and
- Management of pest animals.

8.2 Roles and Responsibilities

There are seven key roles and responsibilities that need to be met to adequately implement this management plan (Refer **Table 19**).

Table 19. Roles and Responsibilities

Role	Qualification	Responsibility
Project Conservation Manager	Minimum Diploma or Degree in Natural Resource Management or related discipline. 10 or more years' experience.	Implementation of OMP Primary point of contact.
Project Ecologist	Tertiary qualifications in ecology. 10 or more years' experience.	Forest enrichment Monitoring OMP compliance (audit).
Bush Regeneration Specialist	Minimum Diploma in Conservation Land Management or equivalent or related discipline. 10 or more years' experience.	Weed management Vegetation planting Manage on-ground Bushfire Management
Project Pest Management Specialist	Minimum Certificate III in Vertebrate Pest Management. 10 or more years' experience.	Preparation of Pest Management Plan.
Project Bushfire Specialist	FPAA - Building Planning & Design Level 2 Accredited.	Preparation of BFMP Oversee delivery of fuel load maintenance.
Weed Reduction and Fuel Load Burns Specialist	Fire team leader qualifications or equivalent.	Conduct and manage hazard and weed reduction burns
Land Holder (the proponent)	N/A.	Implementation of this plan in consultation with suitably experienced and qualified service providers.

8.3 Weed control works

Weed Control works will target weeds of high importance. Major infestations noted and listed during the BioCondition assessments were noted as Chinee apple (*Zizphus mauritiana*), Indian Rubber Vine (*Cryptostegia grandiflora*) and Grader Grass (*Themeda quadrivalvis*). The **following section** of this report has been included to show effective management techniques for these weed species.

8.3.1 Knowledge of Relevant Legislation

It is expected contractors will have a depth of knowledge of relevant legislation to complete site rehabilitation works. This may include Occupational Health and Safety laws as well as environmental and heritage protection legislation. Bush regenerators must comply with the requirements of the *Workplace Health and Safety Act 2011* or, when working on Commonwealth lands, the Commonwealth's *Occupational Health and Safety (Commonwealth Employment) Act 1991*. Contractors should also obtain all relevant permits required under State and Commonwealth legislation (e.g. *Nature Conservation Act 1992, Fisheries Act 1994, Vegetation Management Act 1999, Biosecurity Act 2014* - including Fire Ant Movement Controls). Contractors must also be aware of and adhere to cultural heritage protection obligations under the *Aboriginal Cultural Heritage Act 2003* and where chemicals are in use, the *Agricultural Chemicals Distribution Control Act 1966*. In addition to the above, contractors should also be familiar with local government body requirements (e.g. Pest Management Plans, Local Codes, Policies and Guidelines) and classifications of weeds. Refer to adjacent schedules for classification of weeds under the *Land Protection Act* (superseded by the *Biosecurity Act 2014*).

Under the *Biosecurity Act 2014*, landowners are responsible for taking all reasonable and practical steps to minimise the risks associated with invasive plants and animals under their control. This is known as the general biosecurity obligation (GBO). The act categories restricted matter (restricted plants and animals) into the following:

- Category 1: must be reported to an inspector within 24 hours (includes Red Imported Fire Ants, amongst others).
- Category 2: must be reported within 24 hours to Biosecurity Queensland on 13 25 23.
- Category 3: must not be distributed either by sale or first, or released into the environment.
- Category 4: must not be moved.
- Category 5: must not be kept.

8.3.2 Weed Hygiene

The development of a robust weed hygiene plan will be of great benefit in controlling the spread of grader grass, along with many other weeds. A designated wash-down area should be established on the property. Wash-down procedures may utilise high pressure wash-down, high volume low pressure wash-down, compressed air blast, vacuuming and / or physical removal (e.g. hand brush). The radiator and grill, along wheel trims, mud flaps, tyres and tray, and undercarriage should all be checked for weed seed. Inside the vehicle, check the foot wells and mats to make sure that no weed seed has fallen off your shoes. Before travelling, check clothing and shoes are free of mud and seeds. The designated wash-down area should be monitored for plants growing in this area and all weed growth controlled immediately. Driving through known weed infestations should be avoided unless absolutely necessary and at times when no seed is present on the plants.

8.3.3 Identification Skills

Both native and weed species should be identified prior to primary weed removal works and ongoing throughout the follow-up and maintenance periods. This is to maximise natural regeneration and reduce the likelihood of accidental weed spraying to native vegetation. Regenerating species should be treated and maintained in a similar manner to newly planted revegetation tubestock. If the contractor is unsure of the species, advice should be sought by a botanist, specialist contractor or confirmed with Queensland Herbarium. The indicative Weed Treatment schedules derived from Queensland Herbarium can be referred to for an indication of weed species and treatments.

8.3.4 Chinee apple (*Zizphus mauritiana*)

8.3.4.1 Description

Chinee apple is a large shrub up to 8 m high and 10 m in canopy diameter. The plants are densely branched, from ground level in some cases. Stands of Chinee apple (*Zizphus mauritiana*) grow as open forests or form thorny thickets along waterways. Branches are zig-zag in shape and have a leaf and a thorn at each angle. Leaves are rounded, glossy green on top and almost white underneath, and grow on alternate sides of the branches. Flowers are small, greenish-white and emit an unpleasant smell. The edible fruits are similar in size and structure to a cherry, but pale yellow or orange when ripe.

8.3.4.2 Weed control method

Recommendations for weed control are as follows:

Initial treatment is to occur via the use of mechanical control through stick racking or the use of a cutter bar. The remaining exposed stems are then to be treated with a basal bark spray as soon as practically possible post mechanical control. 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. Another method is a cut stump treatment which has also proven to be effective. Cut the stem off horizontally as close the ground as possible and immediately swap or spray the cut surfaces and stems with the herbicide mixture.

Table 20. Chemical Application for Chinee Apple

Situation	Herbicide	Rate	Comments
Agricultural non-crop areas, commercial and industrial areas, fence lines, forests, pastures and rights-of-way	Triclopyr 240 g/L and Picloram 120 g/L (e.g. Access®)	1 L/60 L diesel	Thoroughly spray all crevices. Basal bark spray plants up to 15cm basal diameter. Cut stump plants greater than 15cm basal diameter. For cut stump, spray immediately after cutting (consult label).
	Fluroxypyr 200 g/L (e.g. Acclaim®, Flagship® 200)	3 L/100 L diesel	Basal bark plants with up to 15cm diameter. Treat circumference of stem to a height of 45cm from the ground. For cut stump, treat plant up to 15cm diameter and spray immediately after cutting (consult label).
	Fluroxypyr 333 g/L (e.g. Starane® Advanced, Fluroken 333®)	1.8 L/100 L diesel	
	Fluroxypyr 400 g/L (e.g. Comet® 400, Decoy 400®)	1.5 L/100 L diesel	
	Triclopyr 600 g/L (e.g. Invader® 600®, Garlon* 600, Redeem® 600)	1 L/60 L diesel	Basal bark plants up to 5 cm diameter. Cut stump plants up to and in excess of basal bark diameter. Spray immediately after cutting (consult label).
Agricultural non-crop areas, commercial and industrial areas, fence lines, forests, pastures and rights-of-way	Triclopyr 300 g/L and Picloram 100 g/L (e.g. Conqueror®, Fightback®)	350 mL/100 L water	Spray plants and seedling regrowth up to 2m tall. Spray when plants are actively growing and cover foliage thoroughly to the point of run-off (consult label). Add a wetting agent e.g. BS-1000 or similar at 100 mL/100L water for best results (consult label).
	Triclopyr 300 g/L, Picloram 100 g/L and Aminopyralid 8 g/L (e.g. Grazon® Extra)	350 mL/100 L water	Add a wetting agent e.g. BS-1000 or similar at 100 mL/100L water for best results (consult label).

8.3.4.3 Weed control timing

Weed control of Chinee apple (*Zizphus mauritiana*) can occur at any time of the year. However, best time for treatment is during autumn when plants are actively growing and soil moisture is good.

Table 21. Chinee Apple cycles and preferred timing of applications

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Flowering												
Fruiting												
Germination												
Physical/mechanical control												
Foliar spraying (chemical)												
Basal bark/ cut stump (chemical)												

	Suitable Window for Control Method (Preferred)
	Suitable Window for Control Method (less suitable)
	Unsuitable Windo for Control Method
	General Growth Pattern

8.3.5 Indian Rubber Vine (*Cryptostegia grandiflora*)

8.3.5.1 Description

Rubber vine is a vigorous climber with twining, whip-like shoots that can grow unsupported as an untidy, multistemmed shrub 1–2 m high, it can scramble up to 30 m high in trees. The stems, leaves and unripe pods exude a white, milky sap when broken or cut. Leaves are dark green and somewhat glossy, 6−10 cm long, 3−5 cm wide, and in opposite pairs. Flowers are large and showy, with five white to light purple petals arranged in a funnel shape. The seed pods are rigid and grow in pairs at the end of a short stalk. The pods are 10–12 cm long, 3–4 cm wide and each can contain up to 450 brown seeds. Each seed has a tuft of long, white, silky hairs, which enable easy dispersal by wind and water.

8.3.5.2 Weed control method

There are several options when addressing Rubber vine infestation recommended methods are:

Fire Control

Rubber vine infestations can be very effectively controlled by burning. Preparing and managing fuel load prior to burning, and following up in a timely manner after the fires, are critical to the overall success of the program. An appropriate fire regime is an effective tool for managing rubber vine over the long term, as well as being an effective follow-up to other control methods.

Mechanical Control

Several mechanical techniques are effective in controlling rubber vine. The type of infestation will determine the technique required. For scattered or medium-density infestations where possible, repeated slashing close to ground level is recommended. For dense infestations, during winter stick-raking or blade-ploughing reduces the bulk of the infestation. Pasture should be sown and windrows burned to kill residual seed.

Herbicide control

Cut stump treatment is the most successful method of herbicide control. Cut the stem off as close to the ground (within 15 cm) as possible; for smaller plants use a machete or similar; larger plants may require a chainsaw. Make sure the cut is horizontal. Immediately spray or swab the cut surface.

Table 22. Indian Rubber vine chemical use

Situation	Herbicide	Rate	Comments
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights-of-way	Triclopyr 300 g/L + Picloram 100 g/L + Aminopyralid 8 g/L (Grazon Extra) or Triclopyr 300 g/L + Picloram 100 g/L (e.g. Conqueror)	350–500 mL/ 100 L water	High volume spray Actively growing plants not infected with rust Use the higher rate for dense stands higher than 1.5 m tall at flowering (consult label)

Table 23. Indian Rubber Vine Treatments

Situation	Initial treatment	Follow-up	Comments
Scattered infestations	Basal bark/ cut stump	Follow-up with basal bark/ cut stump as necessary	Cut stump method preferred where possible
	Fire Repeated slashing	Follow-up basal bark/ cut stump/foliar spray as necessary	For scattered infestations usually recommended only if herbicides are not desired, or if have other invasive plants can be controlled by fire or if fire is utilised to improve pastures
Medium infestations	Foliar spray	Treat regrowth, seedlings with basal bark/cut stump/ foliar spray	Fire and follow-up with basal bark/cut stump/foliar spray as necessary
	Fire Repeated slashing	Fire 1 year later and follow- up basal bark/cut stump/ foliar spray as necessary	If fuel load is sufficient CAUTION: There are some native tree species which are susceptible to fire. Check before burning
Dense infestations previously cleared areas	Stick rake or blade plough	Sow pasture – basal bark/ foliar spray – fire and basal bark/cut stump/foliar spray as necessary	First treatment clears bulk of rubber vine and kills roots; any regrowth or seedlings can then be treated; when grass growth allows fuel build up, fire used as control and individual plants later treated
	Fire	Fire one year later and follow-up basal bark/ cut stump/foliar spray as necessary	If fuel load is sufficient CAUTION: There are some native tree species which are susceptible to fire. Check before burning
Dense infestations along creeks and rivers	Basal bark/ cut stump	Fire or basal bark/cut stump/foliar spray	When bulk of rubber vine killed, allow fuel build up for fire or treat remaining plants individually
	Fire and sow pasture	Fire one year later and follow-up basal bark/cut stump/foliar spray as necessary	If there is a sufficient fuel load to carry a fire, it can open up dense infestations CAUTION: There are some native tree species which are susceptible to fire. Check before burning

8.3.5.3 *Weed Control Timing*

Fire treatment is normally suitable throughout the whole year. It is important to address weather conditions and fuel loads prior to burning.

Table 24. Indian Rubber vine plant cycle and preferred method timing

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Flowering												
Pod Formation												
Seed Drop												
Physical/mechanical control												
Fire Control												
Basal bark/ cut stump (chemical)												

	Suitable Window for Control Method
	Unsuitable Windo for Control Method
	General Growth Pattern

8.3.6 Grader Grass (*Themeda quadrivalvis*)

This is an upright tufted annual grass to 1-2.5m. Flower stalks are stiff and cane-like with red-brown flower spikes bent downwards. A tropical and sub-tropical grass which forms dense swards and stands on roadsides and savannah woodlands. A similar common native species, kangaroo grass, is shorter in stature, perennial and lacks tufts near the seed.

8.3.6.1 Weed Control Method

There are a range of methods that can be used to manage grader grass including physical and chemical control. Any, or all of these may be used in an integrated manner to achieve more effective management outcomes.

Chemical Control

Typical herbicide use that has been proven to be effective is the use of Glyphosate 360g/L. Grader grass should be sprayed when actively growing and young and prior to seeding. Spraying plants prior to reaching full height, or during regeneration periods following slashing and/or burning will reduce time and herbicide requirements. Avoid spraying plants when temperatures are extremely high or when the plants are in standing water as this may result in lower kill rates.

Mechanical Control

Mechanical control should be used in conjunction with chemical application. The use of mechanical control (slashing) is used to encourage growth for chemical application. By opening up the new shoots and reducing height this allows for the chemical application to be more effective in treatment.

Fire

Fire control can be used similarly to that of slashing control. The added advantage of fire is that it will germinate the seed bank and in the long term reduce the overall weed seed bank. If conducted in manageable sized treatment areas the reduction of biomass and engagement of seedbank allows for reduction of overall seedbank. Immediate spraying of regrowth is required. It is important to be able to manage the area of treatment with both management techniques. The use of fire as the only control will only spread the infestation.

Grader grass fires can be highly destructive and hard to control, so careful planning and a cautious approach to burning are essential. Instead early burning (late wet/early dry season) will produce low intensity “cooler” fires that are easier to control, are less likely to damage native vegetation and may kill the young grader grass seedlings. Treating grader grass with herbicide prior to using fire can create the dry matter needed to sustain a fire at this time of year. As previously discussed, post chemical control is required.

8.3.6.2 Seeding

Rehabilitation is an important part of best management practice in the control of grader grass. Re-establishment of the native understory plants or improved pastures will slow down re-invasion. Pasture or native plant seed can be used for rehabilitation. Pasture seed will be non-invasive species appropriate for the area.

8.3.6.3 *Weed Control Timing*

Weed control methods need to be integrated as per the below table to be effective. All mechanical and fire control must be immediately followed up by chemical control.

Table 25. Grader Grass cycle and methods of application

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flowering												
Seed fall												
Germination												
Slashing												
Spraying												
Fire												
Rehabilitation / seeding	Rehabilitation and seeding dependent on environmental conditions.											

	Suitable Window for Control Method (Preferred)
	Suitable Window for Control Method(less suitable)
	Unsuitable Windo for Control Method
	General Growth Pattern

8.4 Pest Management Control

Pest management is a dynamic facet of land management. The below works treatment is to be used as a guide.

With feral pest animal species found to be active on site, an annual action plan will be implemented by using current best practice management, integrating pest management control techniques (baiting, trapping, shooting), whilst using the current toxins registered for use on those species in Queensland. With seasonal variances and peaks in the individual species ecology, timing of control is critical and will be proactive, reactive and planned across the calendar year.

Common feral animals are listed below:

- Wild Dog (*Canis lupus farmilaris*)
- Feral Cat (*Felis catus*)
- European Fox (*Vulpes vulpes*)
- Feral Pig (*Sus scrofa*)

These species are known to be present from field assessments or from data records and are known to predate on Avian species or destroy habitat that the BTF inhabits.

8.4.1 Use of Vertebrate Poisons

Requirements for the use of 1080 (Sodium Fluoroacetate) require extensive planning, communication and record keeping. 1080 is a Dangerous Restricted chemical (Schedule 7) poison. Only Authorized Persons or Commercial Baiting Operator's (CBO) under Queensland's *Health (Drugs and Poisons) Regulations 1996* can obtain, possess, use, issue and dispose of this poison.

A current document has been produced by Queensland Health "Dealing with restricted S7 poisons invasive animal control". Summary and keynote requirements of this document are as follows.

- Neighbours (adjoining and adjacent) surrounding the project site **must** be given 72 hours notice (Written or verbal and a record keep of this for two years) before any program using 1080 commences.
- This communication must also state the length of the baiting program i.e. 2 months.
- Undertake steps that need to be taken to ensure children or domestic and working dogs do not gain access to the bait.
- A mandatory requirement is to place 1080 warning signs on all entrances, corner posts on the boundaries and all gates entering the project site. They must remain up, visible and intact, weather and waterproof for one month after the baiting program has stopped.
- Any 1080 product must be transported in a locked, leak proof container. The primary container must be correctly labelled and only an Authorized Person or Commercial Baiting Operator has access. A current SDS (Safety Data Sheet) must also be present with the product.
- Any unused 1080 or other toxin must be collected after a baiting program has stopped and buried in a pit preferable deeper that one metre.

8.4.2 Feral Animal Baiting

The directions of use of PAKS National 1080 concentrate for the control of Wild Dogs and Foxes in Queensland is a total dose rate of 0.2ml for Wild Dogs and 0.1ML for Foxes of 1080 injected into a piece of dried meat weighing between 125-250grams in size. Dried 1080 meat baits should be placed in strategic locations and placed on tracks at every (approx.) 250m - 500m intervals, depending on terrain, pest animal activity and environmental conditions.

A bait replacement strategy should also occur. Once a 1080 meat bait has been taken from a recorded/mapped GPS bait station, it should be replaced by another meat bait. This 1080 baiting program should occur for Wild Dogs and Feral foxes 2 times a year coordinated and running until bait uptake. This methodology will also support and strengthen the necessity to be proactive and prevent the increase of feral animals within the project area. A major focus on key breeding times for control on Wild Dogs would be in Autumn, Feral Foxes in Winter, then again when

young are independent and start to disperse (Spring and Summer for both Wild Dogs and Foxes). Both a Wild Dog and Feral Fox fact sheet produced by Biosecurity Queensland (refer to reference section) provide useful resources.

Manufactured 1080 baits are shelf stable and are available from Schedule 7 retailers, Commercial suppliers, and Commercial Baiting Operators (CBO). These trade name products below are registered in Queensland for Wild Dogs and Feral Foxes. The manufactured baits combined with the use of dry meat baits will be deployed in the key months.

- De-K9 (PAKS National product registered for Wild Dogs)
- De -FOX (PAKS National product registered for Feral Foxes)
- DOGGONE (Animal Control Technologies registered for Wild Dogs)
- FOXOFF (registered for Feral Foxes)
- HOGGONE and PIGOUT (Animal Control Technologies registered for Feral pigs)

To undertake a 1080 ground baiting operation with a combination of manufactured and dry meat, extensive planning and preparation is required.

Canid Pest Ejectors (CPE's) and the use of 1080 and PAPP (PARA-Aminopropiophenone) capsules may be deployed in the project area for the control of Wild Dogs and Feral foxes. Given their extensive trialing and subsequent registration in Australia by APVMA – Australia Pesticides Veterinary Medicines Authority, CPE'S may be deployed in critical locations primarily placed on pathways/roadways or key natural corridors leading into high value habit and key areas. This control approach therefore needs to be undertaken continually and be monitored by remote cameras. The exact amount of CPE's and baits required to undertake a baiting program in critical habitat or breeding areas is still unknown. From a desktop assessment of the site, approximately 20-30 is likely to suffice in ensuring a chemical buffer is always surrounding the high value habitat.

The deployment of CPE's and 1080 meat baits/grain into the field needs to be managed and mapped by appropriately trained, licensed and experienced operators. The use of any Dangerous Poison (Schedule 7) in Queensland needs to be undertaken by a licensed operator, endorsed by the regulatory body Queensland Health and its Environmental Hazards Unit team.

Feral cats currently in Queensland only have a manufactured bait registered for their use called Curiosity. This bait consists of the toxin (PAPP its active ingredient PARA-Aminopropiophenone). The use of any Dangerous Poison (Schedule 7) in Queensland needs to be undertaken by a licensed operator, endorsed by the regulatory body Queensland Health and its Environmental Hazards Unit team.

To optimise a baiting program for feral cats, it is best undertaken when food sources are scarce. Wintertime in the cooler months of Eastern Australia can result in an increased uptake of baits. In completing a focus for feral cat control an integrated approach consisting also of trapping and shooting is recommended. A bait density across the landscape and per product label directions is no more than 50 baits per square kilometre. The concentration on drainage lines, pathways on route to critical habitats and breeding areas on the project site will enable early detection and subsequent pro-active approach of having toxic baits available for feral cat uptake.

8.4.3 Feral Animal Trapping

Operators using cage traps, soft or steel offset laminated foot hold traps, or portable pig traps must be trained and experienced and follow current legislation and welfare standards. Within Queensland you can use soft or offset laminated jaw traps under the *Animal Care and Protection Act 2001*. Notification process must be in place to let all onsite personnel aware of a pest control operation in progress. Recommended, on all entry points to the project area is large signage advising all people entering site that a pest control operation is in progress, an example signage wording below.

"DANGER – NO UNAUTHORISED ACCESS"

Pest Control operation in progress

Firearms and trapping in use

Start date -------Finish Date

Contact "x" for more information

To undertake a feral fox or feral cat trapping program, the following soft jaw and offset laminated jaw traps can be used:

- Bridger 1.5 (Rubber jaw)
- MB650 (Rubber jaw and offset laminated)
- Jake trap (Rubber jaw) mainly foxes

In keeping with duty of care to a captured animal, traps will be checked every 24hrs, ideally in a position of shade out of the sun if possible. Placement of traps should occur by a trained professional, and mapped and GPS recorded for data collection.

To reduce the impacts of Wild dogs, rubber and offset laminated foot hold traps can be used, including:

- Jake trap (Rubber jaw)
- WTS 3 and 5 (Western Trapping Supplies Rubber jaw or offset laminated)
- MB650 (Rubber jaw or offset laminated)
- Bridger 3 or 5 (Rubber for steel jaw)

With both the Feral fox and Wild Dogs, strategic trap locations are vital, and needs to be undertaken by an experienced operator. The use of remote cameras is beneficial to select a strategic position in the landscape to deploy the traps.

Carcass disposal would need to be considered, all animals left on site and buried in an appropriate hole approx. 2m deep, and sectioned off, signposted accordingly.

8.4.4 Feral Animal Shooting

To humanely destroy feral animals a minimum qualification is required. This National "Statement of Attainment" is called "Use firearms to humanely destroy animals". This course and subsequent qualification enables and guides firearm users to use the correct protocols, reduce hazards and follow procedures to destroy safely and humanely, captured feral animals. Targeted, strategic and opportunistic lethal firearm ground shooting can be undertaken by trained professionals across the project area. Current signage with hours of operation and correct calibre is critical. Given its semi-rural aspect, the job should be lodged with Queensland police to reduce public alarm would be advantageous.

Given the high-risk activity of using a firearm it is recommended once a firearm is on site, a pre- determined, well-marked, isolated area is set aside for marksmanship activities. This involves checking, and double checking the intended firearms are sighted in correctly before actively taking them in the field for use. A preferred length of a safe area would be 100m in length, solid earth background, clear of obstructions and a shooting rest/shelter at one end. Along with this would be a designated area for the potential burial of controlled pest animals, which would consist of a burial hole of 1m with lime added on top to increase decomposition of the carcass, barricaded off and sign posted. Standard Codes of Practice are available on the PESTSMART website (refer to references section), for all feral animal species in this plan.

With experienced personnel utilising firearms to euthanize animals, a risk assessment will need to be undertaken. This may be in the form of a Safe Work Method Statement (SWMS) or Job Safety Analysis (JSA). This may include

notifying numbers, all personal on site, Queensland police and even creating trajectile safety plans to avoid any possible damage to infrastructure by managing ricochet. As an animal is being euthanized, experienced operators will undertake 3 types of shot placement to insure the quickest death possible depending on the situation.

- Temporal shot placement (below the ear)
- Poll shot placement (between the eyes)
- Heart and Lung shot placement (broadside)

Firearm users must also carry a current Queensland Police "Occupational Use" of firearms (Genuine reason) for the destruction of feral animals as part of their business activities or occupation. At a minimum endorsements code on a firearms license need to state the acronym FC2 – Animal Control - Category A and B weapons.

Hours of operation (possible night) may vary depending on what feral animal species is being targeted. With the use of correct ballistics, shooting corridors and advanced thermal scope optics, nighttime operations can be undertaken giving a distinct advantage on reducing pest animals across the project area. With avenues for nighttime ground shooting operations, comprehensive site assessments must be done in daytime hours. This is to ascertain safe projectile trajectory, on site hazards, clarify distance to potential target, confirm what is behind (background) the potential target (livestock, infrastructure etc). This is imperative to eliminate all manageable predetermined risks before firing a firearm in this type of operation.

With all firearms it **must** be transported and used to meet current legislation requirements. Only a licensed firearm user can access the firearm, be transported and locked, unbranded as not to cause public alarm, and bolt and ammunition must be locked away separately.

8.4.5 Use of Remote Cameras

A key element in being proactive and limiting potential feral animal intrusions and population expansion, is to undertake remote camera monitoring. Remote cameras are also a vital tool to use on existing control events, such as pre-feeding for pig trapping, or utilised to view interactions with CPE's (Canid Pest Ejectors). This method of wildlife management is supported by PESTSMART, Australia. Also known as remote camera trapping, it is an efficient non-invasive technique for monitoring both native and non-native species. Given the geographical expanse of the LEIP Offset project area, a total of approximately 20 cameras would need to be deployed to sufficiently cover intrusions of feral animals. Depending on the type of access (vehicle, foot, side by side), cameras will need to be checked at least every two weeks, and where mobile cellular coverage is adequate, remote cameras can take a photo and instantly send the picture as a "alert" to allocated mobile phone numbers or emails.

8.5 Revegetation and Densities

Densities of planting in OMZ-1, OMZ-2, and OMZ-3 are to be factored in with the natural recruitment of vegetation. Should recruitment fall short of the densities mentioned in **Table 26** then infill planting is to occur. It should be noted that areas infested with grader grass should follow the weeding removal procedure which includes native seeding. Should these areas not achieve the required natural ground cover percentage then additional works are to be carried out to reach densities as per **Table 26**.

Table 26. Specified Vegetation Densities

Management Zone & RE	Stratum	Indicative species for planting	Target cover and densities
OMZ-1			
RE 11.3.35	T1 and T2	*Eucalyptus drepanophylla* *Eucalyptus platyphylla** *Corymbia tessellaris** *Corymbia clarksoniana* *Melaleuca viridiflora** *Planchonia careya* *Livistona decora*	50 canopy trees/ha as planted or assisted regeneration
	S	*Acacia crassicarpa* *Macaranga tanarius* *Grewia retusifolia* *Jasminum didymum subsp. racemosum* *Pandanus cookii*	30 shrubs/ha as planted or assisted regeneration
	G	*Themeda triandra** *Heteropogon contortus* *Digitaria parviflora* *Imperata cylindrica* *Cyperus fulvus* *Dianella longifolia var. longifolia* *Lomandra longifolia* *Lomandra filiformis subsp. filiformis*	53% projected foliage cover seeded or natural regeneration
RE 11.3.35a	T1 and T2	*Melaleuca viridiflora** *Planchonia careya* *Livistona decora* *Melaleuca nervosa* *Denhamia disperma*	70 canopy trees/ha as planted or assisted regeneration
	S	*Melaleuca dealbata* *Acacia crassicarpa* *Exocarpos latifolius*	20 shrubs/ha as planted or assisted regeneration
	G	*Schizachyrium fragile* *Chrysopogon fallax* *Themeda triandra** *Heteropogon contortus* *Lomandra longifolia*	59.7% projected foliage cover seeded or natural regeneration
RE 11.3.25b	T1 and T2	*Eucalyptus tereticornis* *Corymbia tessellaris** *Melaleuca fluviatilis* *Eucalyptus platyphylla** *Lophostemon suaveolens* *Casuarina cunninghamiana* *Mallotus philippensis* *Geijera salicifolia* *Glochidion apodogynum*	60 canopy trees/ha as planted or assisted regeneration

	S	*Planchonia careya* *Claoxylon tenerifolium*	30 shrubs/ha as planted or assisted regeneration
	G	*Heteropogon contortus* *Themeda triandra** *Imperata cylindrica* *Bothriochloa bladhii* *Leersia hexandra* *Panicum effusum** *Dichanthium sericeum**	65.6% projected foliage cover seeded or natural regeneration.
OMZ-2 and OMZ-3			
RE 11.3.31	T1 and T2	*Eucalyptus platyphylla** *Grevillea striata,* *Corymbia dallachian* *Corymbia tessellaris**	10 canopy trees/ha as planted or assisted regeneration
	G	*Ophiuros exaltatus* *Dichanthium spp* *Themeda triandra** *Panicum decompositum** *Heteropogon contortus* *Eulalia aurea*	90% projected foliage cover Seeded of natural regeneration.

*Preferable nesting tree species and food grass species for BTF

8.6 Bushfire Management

Bushfires form a serious threat to the survival of BTF habitat. Infrequent bushfire regimes can alter the landscape and reduce the food source availability to the BTF. At adequate time intervals bushfire management action should be implemented to ensure mass landscape changes are not a high or prevalent risk. Reduction of bushfire risk can be managed in several ways. Weed control to reduce or remove the biofuel load is the most common bushfire management practice.

Where required, weed control measures can include low intensity planned burning. Litter cover and coarse woody debris will be maintained by burning only with sufficient soil moisture. **Table 27** outlines a Bushfire Management Strategy specifically designed addressing all four Regional Ecosystem classifications pertaining to the Offset Management Zones.

Table 27. Bushfire Management Strategy

RE Description	Bushfire Regime	Interval	Intensity	Potential Issues
RE 11.3.25b	Protection relies on broad-scale management of surrounding country with numerous small fires throughout the year so that wildfires will be very limited in extent. c-g: Depending on position in the landscape, protection depends on broad-scale management of surrounding country, with numerous small fires throughout the year so that wildfires will be very limited in extent	5 to 7 years	low	Fringing communities are critical habitat. In some situations, it may be best not to burn. Intense and extensive fires degrade vegetation structure and destroy fauna habitats. Restrict the extent and intensity of fires. Hollow trees are critical habitat. Green panic may be an issue and an intensive grazing regime for very short periods, may be necessary to limit potential of wildfire. c-g: If burning is to occur then implement when water level is deep enough to protect the bases of aquatic plants. Sedges are disadvantaged by repeated fires.
RE 11.3.31	Late wet to early dry season when there is good soil moisture. Implement storm burning when there is sufficient fuel. Begin burning soon after the wet season so that fires will carry only a small distance. Patchy burns are preferred. Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Where woody thickening is an issue, implement burns soon after high rainfall events before woody seedlings become established.	5 to 7 years	Primarily low to moderate	Patchy burning within grasslands provides an appropriate mix of fresh and older tussocks and regenerates associated herbs. Fire can be used to control weed invasions, although there are also risks of promoting weeds. Follow up weeding is recommended within a month post burn.
RE 11.3.35	Early dry season when there is good soil moisture, with some later fires in the early storm season or after good spring rains. A predominance of early dry season fires is recommended, although there is value in occasional late dry season fires, or storm burns, over small areas. Burning should begin very soon after the wet season, to secure boundaries and adjacent fire-sensitive vegetation. Subsequent repeat ignitions can be used within the same section of land weeks or months after the boundaries have been secured by early burning, to produce a mixture of burnt areas with multiple ignition dates. Use topographical features to ignite areas as soon as they dry out. This will create a mosaic of areas that were burnt at different dates and unburnt sections within the same area of woodland. Burn away from riparian communities, which can be critical habitat for some species	4 to 5 years	Primarily low to moderate, with occasional high intensity fires	Patchy burning within bushlands provides an appropriate mix of fresh and older tussocks and regenerates associated herbs. Fire can be used to control weed invasions, although there are also risks of promoting weeds. Follow up weeding is recommended within a month post burn.

RE 11.3.35a	A predominance of early dry season fires is recommended, although there is value in occasional late dry season fires, or storm burns, over small areas. Burning should begin very soon after the wet season, to secure boundaries and adjacent fire-sensitive vegetation. Subsequent repeat ignitions can be used within the same section of land weeks or months after the boundaries have been secured by early burning, to produce a mixture of burnt areas with multiple ignition dates. Use topographical features to ignite areas as soon as they dry out. This will create a mosaic of areas that were burnt at different dates and unburnt sections within the same area of woodland. Burn away from riparian communities, which can be critical habitat for some species. Approximately 25% of the grassy woodlands within a landscape should receive patchy fires	2 to 5 years	Low to moderate	These woodlands have a diverse native grass and herb layer that is maintained and promoted by regular fire. Burning that starts immediately after the wet season, with follow up small fires ignited progressively over multiple dates can increase the availability of grass and herb seed, which is a critical food source for many birds and small mammals. Patchy rather than wholesale burning is recommended"

9 Management Actions Summary

Table 28 provides for a Management Action Outline Schedule, summarising methodologies, priority outcomes/objectives, performance indicators and frequency/duration. More specific details have been provided in **Section 8.**

Table 28. Offset Management Actions

Management Action	Site/Management Zone	Methodology	Priority Outcomes/Objectives	Performance Indicator	Responsible Personnel	Frequency/Duration
Preparation, re-instatement of access tracks and maintenance (where required)	OMZ-1 OMZ-2 OMZ-3	Pre-existing farm tracks, fire trails and water point trails have not been maintained or actively used in several areas, limiting the accessibility across the site with several areas of inundation. Therefore, reinstatement of these tracks is required to facilitate the offset management actions. Following identification of track surface erosion issues, reinstatement of tracks involve installation of suitable track surface and foundation materials. The reinstatement of tracks is to occur during the dry season and includes clearing of any overgrown weeds/vegetation. If the pre-existing tack layout is consisting of design flaws, redesign and installation of new track layout is to be considered. Existing and new access tracks are to be maintained to be no wider than 5 m. Prepare and obtain consent for main access track on Valley Drive and respectively Old Flinders Highway at northern aspect.	Allow offset contractors, machinery and vehicles to access the offset area in order to conduct management actions.	Water is not ponding on the track and creating boggy areas providing improved accessibility across the site year around. Erosion of track is minimal during and post heavy rain events. Management actions remain applicable during the offset period if tracks become inaccessible and cause erosion or sedimentation into nearby drainage features.	Bush regeneration specialist. Lite civil contractor or maintenance contractor.	Obtain written approval with TCC to use Valley Drive as main access point to site. Initial restoration of tracks is required and regular maintenance and upkeep of tracks (yearly) will need to occur over the entire offset period.
Fauna friendly stock- and feral pig-exclusion fencing installed and maintained.	OMZ-1 OMZ-2 OMZ-3 Proposed fencing alignment and lockable gate locations as per Plan 10.	Installation of timber post, plain wire and barbed wire and mesh metal grid fencing at 1.5m height, is required on the western border of the elevated bitumen road (Old Flinders Highway) towards former bridge crossing of the Antill Plains Creek. Same stock-proof and feral pig protection fencing design is to continue south of the Antill Plains Creek crossing on Old	Prevent movement of livestock and feral pigs from adjacent grazing leases into offset site to ensure revegetation success, and a reduction in trampling, digging, browsing and compaction.	No livestock observed across offset area. No feral pigs or signs of feral pig activity observed across offset area. Increase in native plant recruitment and species richness.	Fencing contractor or RRDC management group.	Initial construction of fencing, and following, yearly maintenance of fauna friendly stock and feral pig-exclusion fencing.

Management Action	Site/Management Zone	Methodology	Priority Outcomes/Objectives	Performance Indicator	Responsible Personnel	Frequency/Duration
		Flinders Highway road remains and cutting back across the site running east along the existing maintenance track, locking the offset management zones on the south by joining with the Safety fence of Mount Isa Railway line. If using barbed wire at top of fence, the main issues involve fencing placement, visibility of fencing and type of top strand, especially in entanglement hotspots. Therefore, when installing barbed wire components to top of fence, fauna flagging at top of fence is required.	Additional benefit is the prevention of entrance by the general public.			
Management of weed species	OMZ-1 OMZ-2 OMZ-3	Application of a foliar herbicide spray to control any weed species in Year 1 pre-planting, applying adequate herbicide control substances in accordance APVMA herbicide standards. Post planting, spot spraying is to be undertaken around new plantings and regenerating invasive weeds are to be adequately managed with either cut and stump paint or glyphosate injection herbicide application.	Reduce overall weed cover to less than 10%, and reduce high threat weed cover to less than 5%.	Decrease in non-native plant cover to match benchmarked RE Increase in: - Native perennial grass cover and open woodland structure with significant establishment of trees species, recruitment and eventually canopy coverage (year 20). - Native plant species richness and health native shrub cover native perennial grasses.	Bush regeneration specialist with herbicide control license.	Initial weeding, and then yearly maintenance over first 5 years, as per the Specified management strategy. After 5 years, weed management actions continue every 2nd year or until weed suppression is occurring through self- sustaining ecological function and practices.
Management of Chinee apple infestation	OMZ-1 OMZ-2 OMZ-3	The mature Chinee Apple infestation is to be initially managed via slashing, bulldozing and/or fire to reduce the biomass and help with access through infestations. This is to be done incrementally, starting at the edges (undertaken in accordance with a feasible follow-up planning).	Reduce overall weed cover to less than 5%	Decrease in non-native plant cover to match benchmarked RE, resulting in increase of: o native plant species richness and health o native shrub cover o native perennial grasses.	Bush regeneration specialist with herbicide control license	Initial weeding, and then monthly maintenance is to occur for the first year, as per the specified management strategy. Biannual maintenance to take place between Year 1 and Year 4.

Management Action	Site/Management Zone	Methodology	Priority Outcomes/Objectives	Performance Indicator	Responsible Personnel	Frequency/Duration
		Dependent on access of different areas across the offset site, management actions are to be undertaken through a foliar spray application via handgun (quick spray unit) or a splatter gun (difficult access or sensitive vegetation areas). If mature plants have been defoliated, basal bark spraying is to be used. For the portions of site in close proximity (< 100m) to watercourses or the lake, a non-residual herbicide registered for use near waterbodies is to be used. The addition of surfactant negates the environmental rating given to some herbicides. Basal bark spraying or splatter gun (low volume) is the preferred application to reduce off-target damage and degradation of water quality. Follow-up regrowth via spot spraying (knapsack), until native grass or vegetation is re-established. Control of young plants is to be undertaken before they become a year old to prevent new fruit and seeds. It is important that management of the boundary of the offset area involves management of Chinee Apple to prevent weed spread from untreated areas.				After 4 years, Chinee apple management is to occur annually - or until weed suppression is occurring through self- sustaining ecological function and practices. Should weed assessment not show a significant decrease in weed cover these efforts are to be amended and increased in frequency.
Management of Indian Rubber Vine infestation	OMZ-1 OMZ-2 OMZ-3	Initial treatment is to occur via stick-raking or blade-ploughing, then followed up with Burning to ensure death of seed. Fire is very effective form of treatment for rubber vine. Following mechanical and fire control cut stump is to be carried out over the remaining stumps of the plant	Reduce overall weed cover to less than 5%	Decrease in non-native plant cover to match benchmarked RE, resulting in increase of: o native plant species richness and health o native shrub cover native perennial grasses.	Bush regeneration specialist with herbicide control license	Initial weeding, and then monthly maintenance is to occur for the first year, as per the specified management strategy. Biannual maintenance to take place between Year 1 and Year 4.

Management Action	Site/Management Zone	Methodology	Priority Outcomes/Objectives	Performance Indicator	Responsible Personnel	Frequency/Duration
						After 4 years, Rubber Vine management is to occur annually - or until weed suppression is occurring through self-sustaining ecological function and practices. Should weed assessment not show a significant decrease in weed cover these efforts are to be amended and increased in frequency.
Supplementary planting of RE appropriate species (where required)	OMZ-1 OMZ-2 OMZ-3	Planting installation of RE appropriate canopy and sub-canopy species where density does not meet the minimum density thresholds (Refer **Section 5**). Planting densities follow the RE Technical Descriptions and Benchmark as provided by the Queensland Herbarium. Planting activities are to be undertaken in following three stages (where considered applicable): Stage 1 - Year 3 post initial weed management: Planting of Pioneer species to provide a degree of canopy cover and species richness. Stage 2 – Year 3 to 5 or 12 months post initial planting: Planting of enrichment planting species in accordance with RE benchmarks for canopy and native perennial grassland species.	Revegetate degraded open woodland and grassland vegetation communities. Assist natural regeneration in areas where appropriate recruitment was recorded and is determined that vegetation is likely to naturally regenerate with minimal intervention.	Increase in RE associated species richness. Increase in native vegetation cover. Increase in recruitment score.	Bush regeneration specialist or Restoration Ecologist	Initial planting of canopy species 3 years post- initial weed treatment and/or removal of cattle, with planting of shrub and other species occurring one year following. Yearly maintenance during first 5 years as per the Specified management strategy. Maintenance to occur as per requirements (to be determined) post year 5.

Management Action	Site/Management Zone	Methodology	Priority Outcomes/Objectives	Performance Indicator	Responsible Personnel	Frequency/Duration
		Stage 3 – Year 5 – 20: Replacement planting: Annual replacement of failed planting in accordance with the objectives for survival of new plantings. The minimum of the planting density range has been used for applicable vegetation community (e.g., woodland or open forest). During 2nd planting stage, shrubs and groundcovers are to be planted between canopy species, with appropriate densities to be determined. Planting will be focused on species missing from the RE and to include RE appropriate species such as those listed in Technical Description of the RE's. Plantings are to be installed with a mix of slow-release fertiliser and water crystals.				
Watering and fertilising regime	OMZ-1 OMZ-2 OMZ-3 Access of water from RRDC subject to consent and water level of the dam.	Apply sufficient water to each plant to prevent dehydration in accordance with periodic maintenance schedule. Prescribed watering regime may be differed from subject to assessment of real-time ecological conditions by the restoration/maintenance professional. Conditions, such as flooding or prolonged periods of drought can alter the amount of water given to plants.	Encourage native growth and germination. Prevention of reconstruction planting failure.	Increase in recruitment score. Increase in native plant species richness and cover.	Bush regeneration specialist	Weekly for the first 4 weeks then fortnightly for the next 12 weeks subject to weather conditions. If dry weather persists additional waterings may be necessary. If rain occurs, fewer waterings may be necessary.
Bushfire Management (planned burning)		The northern aspect above the Antill Plains Creek is mapped as *Development Constraints Bushfire Hazard* zone. Considering this zoning, weed control measures geared towards reducing or eliminating fuel	Encourage native growth and germination	Increase in native plant species richness. Decrease in non-native plant cover.	Bushfire specialist Local fire brigade in collaboration with indigenous bush	Interval and strategy in accordance with fire regime frequency guidelines of applicable RE and soil moisture conditions.

Management Action	Site/Management Zone	Methodology	Priority Outcomes/Objectives	Performance Indicator	Responsible Personnel	Frequency/Duration
		load is to be undertaken, including low intensity planned burning. Understorey biofuel load (Litter cover and coarse woody debris) is to be maintained by burning only with sufficient soil moisture.			management groups	
Management of pest animals (exclusion or eradication)	OMZ-1 OMZ-2 OMZ-3	Baseline assessments are to be undertaken in Years 1 & 2, to determine the most appropriate species-specific control measures, control locations and timing of pest management. Methodology is to include cage trapping, baiting and/or open range shooting. Consultation is to involve neighbours, to improve success rates through integration and collaboration of pest management activities with neighbouring land owners and on neighbouring properties.	Reduce abundance of non-native predators and non-native herbivores by 90% to improve revegetation success and reduce mortality of native fauna species.	Reduction of pests as per the annual monitoring and assessment. Increase in native fauna species presence.	Pest control contractor	As required depending on species determined to be present by feral animal assessment baseline results (likely to include Dingo/wild dog, deer, , fox, and/or pig). Pest management measures are to be implemented and reviewed annually. Pest management actions are to be ceased if no pest animals are recorded over a full year period. Review of pest animal recordings remains an annual requirement.

10 Performance Management Goals

Tables 29 to 33 detail the measurements of success for the main areas of rehabilitation/management which will provide the required uplift for the offset site.

Table 29. Fencing objectives and performance targets

Management Objective/s	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
Prevent movement of livestock into the Offset site Prevent unauthorised access into the Offset site.	Locked gates and Installation of timber post, plain wire, barbed wire and mesh metal grid fencing at 1.5m height by the end of Year 3. Establish access tracks to facilitate effective application of measures.	Gates/ fences and access tracks maintained in functional order.	Gates/ fences and access tracks maintained in functional order.	Installation by the end of Year 3. Access tracks installed and managed to facilitate delivery of effective management measures, including bushfire management.

Table 30. Weed objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
Reduce Weeds to 5% of Regional Ecosystem level	Extent of Weed cover reduced to <50% of baseline levels by end of Year 3.	Extent of Weed cover reduced to <20% of baseline levels by end of Year 5.	Extent of Weed reduced to <5% of baseline levels by end of Year 10, and then maintained at 5% or less for the remaining period of effect of this approval.	Weed levels maintained at ≤5% of baseline levels.

Table 31. Pest animal objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
Reduce abundance of non-native predators and non-native herbivores.	Two years of baseline survey of pest animals to be undertaken. Develop PMP. Commence pest control in Year 3.	A 90% reduction in the number or abundance of non-native predators and non-native herbivores by the end of year 5, relative to the number or abundance identified during the baseline surveys.	Ensure that the number or abundance of non-native predators and non-native herbivores are then maintained at, or reduced below, the year 5 number or abundance for the rest of the period of effect of the approval.	Ensure that the number or abundance of non-native predators and non-native herbivores are then maintained at, or reduced below, the year 5 number or abundance for the rest of the period of effect of the approval.

Table 32. Hazard reduction burns objectives and performance targets

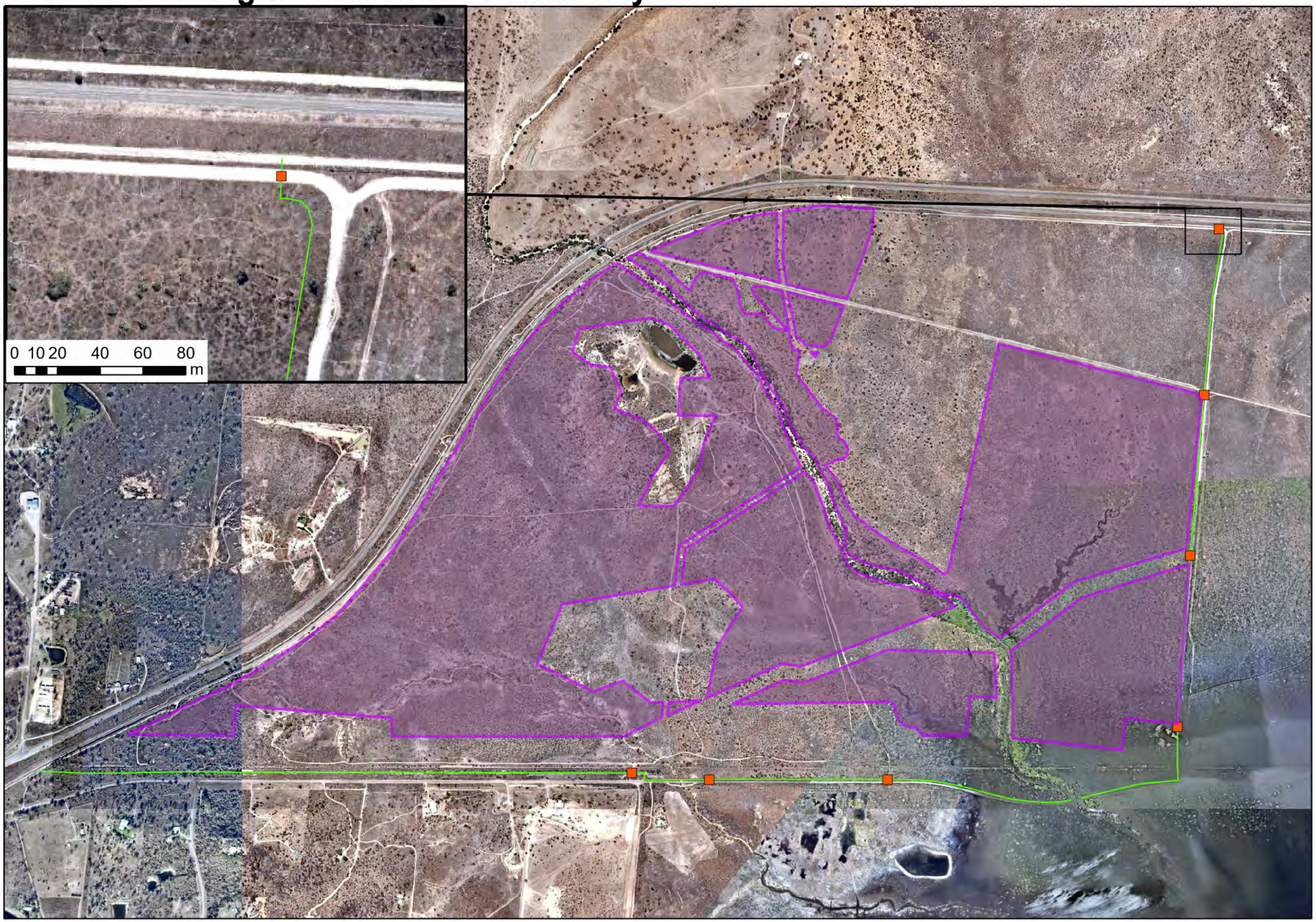
Year	Proposed Management Actions
Years 1 to 3	Conduct a survey of baseline bushfire loads, determine period since last burn and identify existing fire breaks and potential paths by end of Year 1. Undertake assessment of bushfire suppression assets (trails, roads, water points, trail signage and access gates) and determine suitability for fire management operations by end of Year1. Develop BFMP considering baseline survey data to inform ongoing bushfire management activities by end of Year 2. Undertake installation and maintenance to bush fire suppression assets in preparationof implementing prescribed burns by end of Year 3.
Years 3 to 10	Undertake ecological prescribed burn to >50% priority areas identified in BFMP, implementing cool burning practices by end of Year 5.
Years 10 to 20	Undertake ecological prescribed burn to 100% priority areas identified in BFMP, implementing cold burning practices by end of Year 10 (repeat ecological burn where needed).

Note: Additional fire actions will be taken under weeding methodologies. The above table is designed to discuss burning for hazard fuel load reduction only.

Table 33. Proposed habitat regeneration and revegetation objectives and performance targets

Year	Proposed Management Actions
Year 1 to 3	Habitat regeneration: Undertake supplementary planting if performance targets not achieved. Habitat revegetation to meet the densities as specified in **Table 26**. 100 % of replanting to occur by beginning of Year 5 (if required); and Tubestock planted by end of year 5 where required to meet densities as specified in **Table 26**. Ground cover seeding to occur immediately post fire and weed treatments to encourage growth and discourage weed reestablishment
Year 3 to 5	Habitat regeneration: Undertake supplementary planting if performance targets not achieved. Habitat revegetation: Tubestock restocked where required to meet specified density per ha. Replanting to be guided by annual monitoring.
Year 5 to 20	Habitat regeneration: Undertake supplementary planting if performance targets not achieved. Habitat revegetation: Tubestock restocked where required to meet specified density per ha up to Year 10. Replanting to be guided by annual monitoring. Between Years 10 and 12, saplings will be selectively thinned in whipstick areas (if required).

Plan 10. Fencing and Permanent Waterways



Legend

- Fencing
- Offset site footprint
- Offset Investigation Area
- Gates
- Fence_Fixed

N

EVOLVE environmental solutions

Issue	Date	Description	Drawn	Checked
A	29/08/2023	Preliminary	RH	AH

0 90 180 360 540 720
m

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Landsdown Eco Industrial Precinct
Proposed Offset Site

Date: 29/08/2023
Offset Site Analysis

11 Habitat Gain

T**ables 34 to 40** provide insight into the habitat values gain achieved through the proposed offset management actions at the offset site, outlined per Offset Management Zone. These tables will be utilised to inform the adaptive management strategy if, during the offset process, certain objects are not meeting their milestone targets. Refer to **Appendix A and B** for raw data on current habitat quality scoring and offset calculations for future scoring.

Table 34:Modified habitat quality gain – OMZ-1: RE 11.3.35 / 11.3.35a / 11.3.25b remnant vegetation uplift

Item	Benchmark RE 11.3.35 & RE 11.3.35a	Benchmark 11.3.25b	Weighting	Average Current Score	Values Increase with offset	Management aims	Future score
Recruitment of dominant canopy species	100	100	5	0	Recruitment score increased to 5 (≥75% of dominant canopy species present as regeneration)	Weed reduction, planting, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - trees	6	8	5	2.25	≥ 90% of benchmark number of species within each life-form	Weed reduction, planting, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - shrubs	4	4	5	1.845	90% of benchmark number of species within each life-form	Weed reduction, planting, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - grasses	7	7	5	2.726	≥90% of benchmark number of species within each life-form	Weed reduction, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - forbs	12	13	5	1.774	≥ 90% of benchmark number of species within each life-form	Weed reduction, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Tree canopy height (average of emergent, canopy, sub-canopy)	15	17	5	5	To remain steady	Ecological burns to reduce the risk of wildfire.	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	30	27.5	5	2.905	Tree canopy cover score increased to 3 (≥10% or ≤50% of benchmark)	-	3
Shrub canopy cover	5	6	5	2.762	Shrub canopy cover score increased to 5 (50% of benchmark)	Weed reduction, planting, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native Perennial grass cover	52	10	5	2.024	≥ 50% of benchmark native perennial (or preferred and intermediate) grass cover	Extensive weed reduction, exclusion of cattle will result in increase of grass cover.	3
Organic litter	15	35	5	2.833	≥ 10 to <50% of benchmark organic litter	Weed reduction, planting, to encourage species diversity, will result in an increase in species.	3
Large trees	32	34	15	2.143	Large trees score will in all reality not increase to provide large trees over a 20 year timeframe but rather increase tree numbers and richness to increase large tree measurement over a 40 year period	Ecological burns to reduce the risk of wildfire.	5

Item	Benchmark RE 11.3.35 & RE 11.3.35a	Benchmark 11.3.25b	Weighting	Average Current Score	Values Increase with offset	Management aims	Future score
Coarse woody debris	319	148	5	0.429	Coarse woody debris to improve to >/= 10 to <50% or >200% of benchmark number or total length of CWD	Through natural grow of current vegetation forms	2
Non-native plant cover	0	0	10	0.905	Non-native plant cover score increased to 5 ≥5 – 25% of vegetation cover are non-native plants).	Extensive weed reduction.	5
Quality and availability of food and foraging habitat	25	25	25	8.969	-	Extensive weed reduction. And habitat planting	15
Quality and availability of shelter	25	25	25	16.369	-	Extensive weed reduction. And habitat planting	20
Site Condition Score				**52.95**			**91**
MAX Site Condition Score				**130**			**130**
Site Condition (out of 3)				**1.19**			**2.1**

Table 35. OMZ-2 RE11.3.31 – Grassland

Item	Benchmark 12.3.31	Weighting	Current Score	Values Increase with offset	Management aims	Future score
Native plant species richness - trees	3	5	2.5	Tree species richness score increased to 5 (≥90% of benchmark; ≥7.5 tree species).	Weed reduction, planting, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - grasses	6	5	3	Grass species richness score increased to 5 (≥90% of benchmark; ≥5.5 grass species).	Weed reduction, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - forbs	7	5	2	Other species richness score increased to 5 (≥90% of benchmark; ≥12 other species).	Weed reduction, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Tree canopy height (average of emergent, canopy, sub-canopy)	14	5	4	Tree canopy height score increased to 5 (≥70% of benchmark).	Ecological burns to reduce the risk of wildfire.	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	10	5	2	Tree canopy cover score increased to 5 (≥50% or ≤200% of benchmark)	-	5
Native Perennial grass cover	77	5	1.4	Native perennial grass cover score increased to 5 (≥90% of benchmark; ≥27% native perennial grass cover)	Extensive weed reduction, exclusion of cattle will result in increase of grass cover.	5
Organic litter	12	5	3.2	≥50% or ≤200% of benchmark organic litter	Weed reduction, planting, to encourage species diversity, will result in an increase in species.	5

Item	Benchmark 12.3.31	Weighting	Current Score	Values Increase with offset	Management aims	Future score
Large trees	1	15	3	0 to 50% of benchmark number of large trees	Ecological burns to reduce the risk of wildfire.	5
Non-native plant cover	0	10	1.60	Non-native plant cover score increased to 10 (<5% of vegetation cover are non-native plants).	Extensive weed reduction.	10
Quality and availability of food and foraging habitat	25	25	11.3	-	Increased foraging through planting and ecological burns	15
Quality and availability of shelter	25	25	15.50	-	Improve shelter through planting	20
Site Condition Score			**49.5**			**85**
MAX Site Condition Score			**110**			**110**
Site Condition			**1.35**			**2.31**

Table 36. Modified habitat gain – OMZ-3: RE 11.3.31 non-remnant vegetation uplift

Item	Benchmark 12.3.31	Weighting	Current Score	Values Increase with offset	Management aims	Future score
Native plant species richness - trees	3	5	2.78	Tree species richness score increased to 5 (≥90% of benchmark; ≥7.5 tree species).	Weed reduction, planting, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - grasses	6	5	3.33	Grass species richness score increased to 5 (≥90% of benchmark; ≥5.5 grass species).	Weed reduction, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Native plant species richness - forbs	7	5	2.50	Other species richness score increased to 5 (≥90% of benchmark; ≥12 other species).	Weed reduction, ecological burns to encourage species diversity, exclusion of cattle will result in an increase in species.	5
Tree canopy height (average of emergent, canopy, sub-canopy)	14	5	2.78	Tree canopy height score increased to 5 (≥70% of benchmark).	Ecological burns to reduce the risk of wildfire.	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	10	5	1.78	Tree canopy cover score increased to 5 (≥50% or ≤200% of benchmark)	-	5
Native Perennial grass cover	77	5	1.44	Native perennial grass cover score increased to 5 (≥90% of benchmark; ≥27% native perennial grass cover)	Extensive weed reduction, exclusion of cattle will result in increase of grass cover.	5
Organic litter	12	5	1.22	≥50% or ≤200% of benchmark organic litter	Weed reduction, planting, to encourage species diversity, will result in an increase in species.	5
Large trees	1	15	6.66	0 to 50% of benchmark number of large trees	Ecological burns to reduce the risk of wildfire.	6.66

Item	Benchmark 12.3.31	Weighting	Current Score	Values Increase with offset	Management aims	Future score
Non-native plant cover	0	10	0.00	Non-native plant cover score increased to 10 (<5% of vegetation cover are non-native plants).	Extensive weed reduction.	10
Quality and availability of food and foraging habitat	25	25	12.59	-	Increased foraging through planting and ecological burns	15
Quality and availability of shelter	25	25	11.39	-	Improve shelter through planting	20
Site Condition Score			**46.5**			**86.6**
MAX Site Condition Score			**110**			**110**
Site Condition			**1.27**			**2.36**

Table 37. Site Context whole of site

Item	Current Score	Values Increase with offset	Management aims	Future score
Size of patch (HA) (out of 10)	10	Precautionary Approach applied	Contiguous landscape is considered BTF habitat already (Maximum score is already applied)	10
Connectedness (out of 5)	5	Precautionary Approach applied	Adjacent areas are already considered to be BTF habitat (Maximum score is already applied)	5
Context (out of 5)	5	Precautionary Approach applied	Adjacent areas are already considered to be BTF habitat (Maximum score is already applied)	5
Ecological Corridors (out of 6)	6	Precautionary Approach applied	Adjacent areas are already in a corridor. (Maximum score is already applied)	6
Role of site location to species overall population in the state (out of 5)	5	Precautionary Approach applied	BTF is has been located on the offset site and is already considered important in the role of the species.	5
Threats to the species (out of 15)	6	Precautionary Approach applied	Reduction of threats through fire management and weed management	10
Species mobility capacity (out of 10)	8	Precautionary Approach applied	Capacity will improve through improved habitat rehabilitation and management but at this stage the precautionary approach will be applied as there are not definitive areas of measurement currently available.	8
Site Context Score	45			49
MAX Site Context Score	*56*			
Site Context Score - out of 3	*2.41*			*2.63*

Table 38. Species Stocking Rate Whole of Site

Species Stocking Rate (SSR)							**Updated Score**
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5	10		**10**
		No		Yes - adjacent	Yes - on site		
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15		**15**
		Not habitat	Dispersal	Foraging	Breeding		
Approximate density (per ha)	Score	0	10	20	30		**20**
		0%					-
Role/importance of species population on site*	Score (*Total from supplementary table below)*	0	5	10		15	**10**
		0	5 - 15	20 - 35		40 - 45	-
Total SRR score (out of 70)	55						**55**
SRR Score (out of 4)	**3.14**						**3.14**

Table 39. Species Stocking Rate Supplementary Table Whole of Site

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	**10**
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	**5**
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	**15**
		No	Yes/ Possibly
*Near the limit of the species range	Score	**0**	15
		No	Yes

Table 40. Offset Improvement Summary

Rehabilitation Group	OMZ-1	OMZ-2	OMZ-3
Site Condition	2.1	2.31	2.36
Site Context	2.63	2.63	2.63
Species Stocking Rate	3.14	3.14	3.14
MHQA Score	**7.87**	**8.08**	**8.13**

12 Offset Management Risks Analysis

The main risks identified to achieve environmental uplift on the offset site, are:

- Reduction In water availability: Southern Black Throated Finch is an obligate drinker and reduction in water availability, by drought for example, without sustained permanent water sources would significantly impact the ability for the Southern Black Throated Finch to utilise the habitat (DEWHA, 2009).
- Exotic weed dominance: Exotic weeds can reduce availability of quality habitat and food grasses to the Southern Black-Throated Finch (DEWHA, 2009). In particular, invasive exotic pasture species could impede on availability of food source seed grasses, and dominance of Chinee apple is considered a significant risk to the mobility capacity and bare ground availability to the species. Therefore, control of exotic vegetation is considered essential and integral to the success of the offset.
- Risk of fire: Fire during breeding season can cause disturbance to nesting habitat and failure of breeding (DEWHA, 2009).

This section describes the effectively accounting for, and management of the risks for failure in achieving a conservation outcome through offsetting of prescribed SRI. A majority of the land parcels surrounding the RRD and the offset site is owned by TCC. This reduces the risk of controlling land management practices that could form a risk to the offset site and remaining access to the site throughout the offset period.

Therefore, we consider that there are significant advantages to working with TCC as opposed to small landholders, which includes minimising these risks. This is largely due to being more in control of management activities and practices taking place across the site and considering TCC objectives for land improvement on and surrounding the site. There will be no competing land uses over the offset site, and as such will remain available to offset activities and management only, under binding obligation under the contract. Further, all land based boundaries are or will be appropriately fenced and secured under locked gates. This reduces risk further and allows for greater control over the offset land.

The risk items are assessed and rated according to the Risk matrix in **Table 41 and 42**. The results of the risk assessment are presented as per **Table 43**.

Table 41. Likelihood of risk occurring

Likelihood	Qualitative description	Quantitative description
Almost Certain	The event is expected to occur in most circumstances	May occur once a month or more frequently
Likely	The event will probably occur in many circumstances	May occur once every year
Possible	Identified factors indicate the event could occur at some time	May occur once every 2 or 3 years
Unlikely	The event could occur at some time but is not expected	May occur once every 5 years
Rare	The event may occur only in exceptional circumstances	May occur once every 10 years

Table 42. Qualitative Risk Analysis Matrix

RATING	CONSEQUENCES	LIKELIHOOD				
		Rare - 1	Unlikely - 2	Possible - 3	Likely - 4	Almost certain - 5
5	**Severe -** Permanent and/or very long term damage to areas of significant value, e.g., permanent loss of vegetation through pest invasion.	H	H	E	E	E
4	**Major -** Significant and/or long term damage to areas of high value, e.g., significant loss of vegetation through pest invasion.	M	M	H	H	E
3	**Moderate -** Moderate or medium term damage to areas of value, e.g., moderate loss of vegetation through pest invasion.	M	M	M	H	H
2	**Minor -** Minor and/or short term damage to areas of low value, e.g., minor loss of vegetation through pest invasion.	L	M	M	M	H
1	**Insignificant -** Insignificant or very short term damage to areas of very low or negligible value, e.g., insignificant loss of vegetation through pest invasion.	L	L	L	M	M

Low Risk (L)	Moderate Risk (M)	High Risk (H)	Extreme Risk (H)
Requires routine action	Requires moderate action < 1 Month	Requires priority action < 2 Weeks	Requires immediate action < 1 Week

Table 43. Risk Management Strategy Fire, Flood Drought. Cyclone (Natural Events) |Pest (Fauna Flora) Human Induced Risk & Road: Noise & Bird Strike

Risk or Hazard	Consequence	Likelihood	Risk Level	Justification	Trigger/s	Mitigation Strategy/Remedial Actions
New restricted invasive plant species is detected on-site	**Moderate**	**Unlikely**	**Low**	Low level of risk applied based on the combination of existing levels of exposure to invasive plant including associated nearby seed sources, and the improved control measures under proposed management actions, such as constrained accessibility and a comprehensive pest plant management approach targeting eradication/control of weed species. Monitoring program will assist in providing input to adaptive pest plant management strategy if necessary.	Detection of new restricted invasive species, by annual inspection or during ground maintenance observations	• Targeted weed control and focus on containment, within 2 months of detection. • Notify Government Agency and neighbours of new environmental weed outbreak. • Implement new hygiene controls. • Address in OMP Review. • Follow all directions and guidance provided by relevant state government agency to assist in control.
Increased weed cover or non-response of treated areas	**Moderate**	**Possible**	**Medium**	Implementation of staged weed management and monitoring program over the duration of the offset period will ensure adaptive management is to be applied if weed control fails.	Review of monitoring data	• Increase the frequency of weed control events • Investigate alternative weed management regimes or techniques for species which do not respond to treatment • Suitably qualified and experienced person to review and revise management plans if it is found that changes are necessary to achieve completion requirements
A decrease in BioCondition or habitat value measured by monitoring efforts	**Moderate**	**Possible**	**Medium**	Adaptive management strategy allows for change in uplift approach to adjust to the factors causing decrease in BioCondion or habitat quality score, such as climate change or unprecedented browsing pressures of pest animals.	Review of monitoring data	• Review external factors (climate) and monitoring effort • Revise OMP and consider new management strategies
Plants dehydrate prior to establishment due to dry conditions	**Moderate**	**Possible**	**Medium**	Adaptive management approach ensures risk is managed, through prolonging plant maintenance activities and increasing plant maintenance frequencies during establishing period(s), if deemed necessary.	Dry conditions prevail at time of planting Plants are observed to be dehydrating by maintenance crews	• Increase watering frequency • Implement corrective measures and revise OMP (Third party review if required)
Inundation of offset area due to floods and/or uncontrolled rising levels of RRD	**Moderate**	**Possible**	**Medium**	Ross River Dam levels are controlled through as spillway at its north-western aspect, resulting in low risk	Rising dam level records would trigger RRD management to alarm for flood risks.	• Scheduled inspection of offset revegetation areas and adjust watering regime to prevent overwatering post flood events.

Risk or Hazard	Consequence	Likelihood	Risk Level	Justification	Trigger/s	Mitigation Strategy/Remedial Actions
				of floods caused by rising dam levels. Flood caused by stormwater reaching the site from upstream drainage resources is considered possible, however, due to dam water level management, this risk is alleviated under existing control measures. Excessive flood events would result in short period flood events, which selected revegetation species are able to subdue.	OMZ areas are observed to be inundated. Plants are observed to failing due to anaerobic processes – root rot and dieback in wilting foliage.	• Management of RRD dam levels in collaboration with RRD operational management group to prevent and mitigate flood events on OMZ's.
Erosion impacts within alluvial plains and waterways during period of floods	**Moderate**	**Unlikely**	**Low**	No significant signs of erosion were recorded in alluvial plains of the offset site during the survey period, which took place only days after a period of heavy rain events. Proposed planting activities are adapting to saturation levels and aim to provide soil stability functions.	Alluvium plains are recording erosion on stream banks and within streambeds, including monitoring of silt accumulation downstream the offset area.	• No access through alluvial plains to be provided apart from through existing maintenance tracks • Inspect access tracks and waterway crossings regularly for faults in drainage and signs of erosion along streambanks. • Restriction of access to essential personnel • Restricting access to the public
Fire damage due to unmaintained firebreaks	**Major**	**Possible**	**High**	Level of risk is highly reliant on surrounding land and associated land management practices (firebreaks) and climate change effects. As surrounding land management activities fall outside the project scope span of control, fire damage due to unmaintained firebreaks is considered a high risk factor.	Grass height is greater than 150mm on grassed firebreaks Risks of fire include destroying desirable veg, and exposing soil and causing erosion	• Scheduled slashing or grading of firebreaks • Carefully managed biomass levels within offset area • Prepare and implement post fire recovery plan • Complete post fire survey, map fire damaged areas, and revise the OMP

13 Monitoring Reporting Requirements and KPI's

In order to identify whether or not an offset site is successfully managed to maintain the viability of the prescribed matter, the management plan requires a monitoring and reporting program. The programs are to be implemented and subsequently, to be submitted to the administrating agency, addressing the performance against the stated conservation outcomes and management objectives.

13.1 Monitoring Actions

Habitat quality monitoring will include a Modified Habitat Quality Assessments as per the baseline assessment methodology, undertaken once every 2 years until the completion of the offset to assess the progress of criteria towards meeting the goal. Values for performance indicators are provided for each item or indicator within the MHQA baseline assessment, as performance is unlikely to be incremental. However, if the value for an indicator is decreasing, rather than being maintained or increasing, then this should trigger a review of monitoring effort and management actions.

Photo monitoring will be undertaken annually, ideally on the same date each year or as near as possible to the same date each year (weather depending) to ensure consistency and to account for seasonal variations in vegetation structure such as non-native plant species (weeds) and grass cover.

All photos will also be taken in high resolution format and recorded on a photo monitoring record sheet that will be submitted to DCCEWW together with the associated photos in electronic format. This record sheet will include at a minimum, photo reference numbers, date, time and location details, including GPS references, as well as any relevant notes.

One monitoring point will be established at the centre point of the established habitat assessment transect location and marked with a permanent stake or similar in addition to GPS locating to facilitate ease and reliability in re-locating the same point for consecutive monitoring events. Four photos are to be taken from this point on each monitoring occasion, one facing each of the cardinal directions. Photos should be taken in a landscape orientation to maximise the amount of site vegetation captured. To facilitate comparison between photo monitoring events permanent markers should be placed or distinctive landscape features selected to ensure consistent orientation of the camera.

At least two additional photo monitoring points are to be selected at the discretion of the monitoring personnel with the purpose of capturing a visual record of areas of particular significance to the sites rehabilitation not otherwise reflected by visual site monitoring, such as tracking areas of significant weed infestation.

Daily Works Record Sheet of herbicide application will be undertaken, and these records will be kept for the duration of the offset. Records should include herbicide use, man hours, a weed list and comments on any site damage or additional maintenance requirements. These metrics could be used as an indicator of weed persistence over time.

Records of agreed management actions outlined in **Section 8** will also be provided annually.

Table 44. Monitoring Actions

Monitoring Action	Timeframe	Actions	Frequency
Modified Habitat Quality Assessment	Year 1 to 20 10 times	Habitat quality score derived from Modified Habitat Quality Assessment based on Guide to determining terrestrial habitat quality (DES, 2020)	Once every 2 years
Photo Monitoring	Year 1 to 20 10 times	Permanent photo points to be established (with star pickets). Analyses success or failure of relevant management actions based on photo evidence taken	Once every 2 years
Records of Agreed Management Actions	Year 1 to 20 10 times	Details of agreed management actions undertaken as outlined in Section 8,9 and 10, including: • The type and location of management actions undertaken • The date undertaken • Outcomes • Issues • Any other relevant information	Once every 2 years
Daily Works Record Sheet	Year 1 to 20	Recording of: • Herbicide output • Man hours • Weed list • Notes on damage or maintenance requirements	Once per maintenance run

13.2 Reporting

Records will be kept in order to document the dates, methods and outcomes of the management and monitoring measures to be implemented. Records of all management actions will be maintained by the proponent to demonstrate compliance with the OMP and any conditions of approval for the offset. BioCondition and photo monitoring must be implemented with the frequency detailed in **Table 44** and reported. Reporting is to occur bi-annually or as per approval requirements by the regulator, including assessment of the offset against the Performance Indicators.

Detailed records of any unsuccessful plantings and associated replanting will also be kept and provided to DCCEWW as part of the offset monitoring and reporting requirements. In addition, records will also be kept and provided to DCCEWW in relation to weed, fire and feral animal management and to the management of BTF, including records of any sightings and/or evidence of occupation on the sites concerned.

13.3 Annual Management Plan Review

The annual review will adopt the structure of an adaptive management strategy.

The Review will examine:

- Results of monitoring activities and how they relate to the progress of the offset;
- Any changes of site conditions;
- Any performance indicators not met, and provide remedial management solutions or further investigation required to achieve success of the offset;
- Changes to cost of management activities; and
- Include management of the next year of the offset.

If any revisions occur which relate to any information within this ODP, the ODP must also be revised.

14 Legal Security Mechanism

Legal security of the offset site is required to enable the protection and management of the *prescribed environmental matter* on the offset site and to ensure the proposed offset management activities will be undertaken and protected for the minimum of the duration of the offset project (20 years).

14.1 Voluntary Declaration

The offset area will be secured through the legally binding mechanism of a Voluntary Declaration (the VDec) under the Vegetation Management Act 1999 (VM Act). The VDec process provides a simplified and streamlined protection procedure for landholders seeking to voluntarily protect areas of generally non-remnant native vegetation on their land. The V-Dec Management Plan will be prepared in accordance with the Guide to voluntary declarations under the Vegetation Management Act 1999, published by the Department of Natural Resources, Mines and Energy, and their listed requirements (DNRME, 2019). In summary, the VDec:

- must be accompanied by a management plan that outlines the activities required to achieve the management intent and outcomes, such as achieving net environmental gain as described in this OMP.
- is declared by the Queensland Department of Resources and is registered in title. A VDec is binding on all current and future owners of the land until the intent and outcomes of the management plan have been achieved, which in the OMP concerns a proposed timeframe of 20 years or until objectives are achieved.

In general, a VDec provides protection for native vegetation for a range of purposes, including legal security for offset areas and addressing Commonwealth offset requirements un the EPBC Act.

All land parcels subject to the offset activities and captured under the OMZ's are to be secured per VDec and agreed upon by the applicable owners of the land, which in the OMP concerns the TCC. It is important to note that a protected area cannot be a legally secured offset area unless it was declared after the offset condition has been imposed.

The following information in relation to the legal security mechanism of a VDec is to be included:

- Details of land which the legal security mechanism is to be placed over;
- Evidence of the relevant agency's in-principal support for the proposed mechanism;
- The timeframe proposed for obtaining legal security after the agreed delivery arrangement has been entered into and an explanation why this timeframe is suitable;
- Explanation as to why that type of legally binding mechanism has been selected, and how the stated measures are reasonable and practical;
- If the legal security mechanism is a protected area, provide evidence that the area will be declared after the offset condition is imposed;
- Where the offset is already a legally secured offset for another purpose, please provide details of the legal security; or
- Where no legal security is proposed, provide evidence that legal security is not required or consider reasonable or practical.

15 Adaptive Management Principles

An adaptive implementation program will be used to ensure uncertainty is reduced over time, and that completion criteria are attained and maintained over the period of approval. As more information becomes available following ongoing performance monitoring, the management and monitoring regime will be reviewed and revised to maximise the likelihood of attaining and maintaining the outcomes to be achieved by implementing the OMP. Any updates to the OMP which do not result in a material change to the environmental outcomes, performance and completion criteria will be made by TCC without the requirement of informing the DCCEEW. If material amendments are likely to alter the environmental outcomes, or performance and completion criteria proposed to the OMP, the amendments and justification for the contingency measures will be provided to the DCCEEW in writing.

Adaptive management will be used to incorporate changes in any of the following areas:

- Assimilation of new data or information:
  Such as, updates to conservation advice or new threat abatement plans relevant to the southern black-throated finch.
- Project coordination and scheduling:
  To manage unforeseen disruptions to schedule such as inclement weather on contractor works for management actions and environmental consultant monitoring events.
- Annual review of risks:
  To refresh the mitigation measures should new threats be identified or stochastic events such as unplanned fires or floods occur.
- Annual review of management measure effectiveness:
  to increase the frequency or change the method of management actions where monitoring performance criteria are not met.
- Contingency for unplanned incidents:
  Such as stochastic events including unplanned fires or floods.

16 References

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Appendix A

Modified QLD Habitat Quality spreadsheet for current values of the offset site – All Assessment Units

BTF OFFSET MANAGEMENT ZONE 1: 11.3.35 / 11.3.35a / 11.3.25b Remnant

Assessment Unit - Regional Ecosystem	AU2 - RE 11.3.35 Remnant																							AU3 - RE 11.3.35a Remnant									AU4 - RE 11.3.25b Remnant								
Site Reference	Benchmark	Z1			Z2			Z3			Z4			Z5			Z6			Z7			Average %	Average	Benchmark	Z8			Z9			Average %	Average	Benchmark	H7			H8			Average %	Average
	11.3.35	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Score	11.3.35a	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score			11.3.25b	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Score
Recruitment of woody perennial species in EDL	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Native plant species richness - trees	6.0	3.0	50.0	2.5	4.0	66.7	2.5	5.0	83.3	2.5	2.0	33.3	2.5	4.0	66.7	2.5	5.0	83.3	2.5	3.0	50.0	2.5	61.9	2.5	6.0	4.0	66.7	3.0	4.0	66.7	3.0	66.7	3.0	8.0	3.0	37.5	2.5	1.0	12.5	0.0	25.0	1.25
Native plant species richness - shrubs	4.0	0.0	0.0	0.0	3.0	75.0	2.5	2.0	50.0	2.5	1.0	25.0	2.5	0.0	0.0	0.0	2.0	50.0	2.5	1.0	25.0	2.5	32.1	1.8	4.0	4.0	100.0	5.0	0.0	0.0	0.0	50.0	2.5	4.0	1.0	25.0	2.5	0.0	0.0	0.0	12.5	1.25
Native plant species richness - grasses	7.0	9.0	128.6	5.0	7.0	100.0	5.0	5.0	71.4	2.5	7.0	100.0	5.0	4.0	57.1	2.5	6.0	85.7	2.5	7.0	100.0	5.0	91.8	3.9	7.0	4.0	57.1	3.0	4.0	57.1	3.0	57.1	3.0	7.0	3.0	42.9	2.5	1.0	14.3	0.0	28.6	1.25
Native plant species richness - forbs	12.0	3.0	25.0	2.5	2.0	16.7	0.0	2.0	16.7	0.0	7.0	58.3	2.5	2.0	16.7	0.0	4.0	33.3	2.5	2.0	16.7	0.0	26.2	1.1	12.0	4.0	33.3	3.0	5.0	41.7	3.0	37.5	3.0	13.0	5.0	38.5	2.5	2.0	15.4	0.0	26.9	1.25
Tree canopy height (average of emergent, canopy, sub-canopy)	15.0	13.8	92.0	5.0	15.0	100.0	5.0	14.5	96.7	5.0	14.0	93.3	5.0	11.5	76.7	5.0	12.5	83.3	5.0	13.0	86.7	5.0	89.8	5.0	10.5	16.0	152.4	5.0	16.0	152.4	5.0	152.4	5.0	17.0	17.0	100.0	5.0	16.0	94.1	5.0	97.1	5.00
Tree canopy cover (average of emergent, canopy, sub-canopy)	30.0	0.0	0.0	0.0	6.3	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	11.0	0.0	27.3	91.0	5.0	2.9	9.7	0.0	19.0	0.7	22.5	48.3	214.7	5.0	12.0	53.3	3.0	134.0	4.0	27.5	31.5	114.5	5.0	18.5	67.3	3.0	90.9	4.00
Shrub canopy cover	5.0	5.1	102.0	3.0	0.0	0.0	0.0	1.9	38.0	3.0	0.0	0.0	0.0	0.8	16.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	22.3	1.3	5.0	2.9	58.0	3.0	5.6	112.0	5.0	85.0	4.0	6.0	31.0	516.7	3.0	2.0	33.3	3.0	275.0	3.00
Native Perenial grass cover	52.0	0.6	1.2	0.0	21.0	40.4	1.0	23.0	44.2	1.0	19.6	37.7	1.0	5.0	9.6	0.0	0.0	0.0	0.0	7.6	14.6	1.0	21.1	0.6	52.0	11.4	21.9	3.0	25.8	49.6	3.0	35.8	3.0	10.0	0.0	0.0	0.0	86.7	866.7	5.0	433.3	2.50
Organic litter	15.0	47.4	316.0	3.0	13.4	89.3	5.0	7.4	49.3	3.0	2.8	18.7	3.0	0.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.8	2.0	15.0	17.6	117.3	5.0	0.4	2.7	0.0	60.0	2.5	35.0	32.0	91.4	5.0	16.3	46.4	3.0	68.9	4.00
Large trees (euc plus non-euc)	32.0	4.0	12.5	5.0	18.0	56.3	10.0	24.0	75.0	10.0	10.0	31.3	5.0	12.0	37.5	5.0	20.0	62.5	10.0	0.0	0.0	0.0	39.3	6.4	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Coarse woody debris	319.0	30.0	9.4	0.0	29.0	9.1	0.0	19.0	6.0	0.0	10.0	3.1	0.0	7.0	2.2	0.0	34.0	10.7	2.0	11.0	3.4	0.0	6.3	0.3	319.0	22.0	6.9	0.0	0.0	0.0	0.0	3.4	0.0	148.0	30.0	20.3	2.0	0.0	0.0	0.0	10.1	1.00
Non-native plant cover	0.0	36.2		3.0	65.4		0.0	46.0		3.0	47.9		3.0	95.4		0.0	2.4		10.0	85.0		0.0	54.0	2.7	0.0	65.2		0.0	65.1		0.0	65.2	0.0		68.7		0.0	65.0		0.0	0.0	0.00
Quality and availability of food and foraging habitat				11.7			13.3			10.0			18.3			6.7			10.0			13.3	11.9				8.3			6.7	7.5				10.0			5.0	0.0	7.50
Quality and availability of shelter and breeding ground				15.0			17.5			15.0			15.0			10.0			22.5			12.5	15.4				22.5			10.0	16.3				20.0			15.0		17.50
Site Condition Score				55.7			59.8			57.5			62.8			34.7			74.5			41.8	55.5				65.8			41.7	53.8				60.0			39.0		49.5
MAX Site Condition Score				*130*			130			*130*			*130*			*130*			*130*			*130*	*130*				*130*			*130*	*130*				*130*			*130*		*130*
Site Condition Score - out of 3																							**1.28**									**1.24**									**1.14**
Site Context																																										
Size of patch (HA) (**out of 10**)				10			10			10			10			10			10			10	10				10			10	10				10			10		10
Connectedness (**out of 5**)				5			5			5			5			5			5			5	5				5			5	5				5			5		5
Context (**out of 5**)				5			5			5			5			5			5			5	5				5			5	5				5			5		5
Ecological Corridors (**out of 6**)				6			6			6			6			6			6			6	6				6			6	6				6			6		6
Role of site location to species overall population in the state (**out of 5**)				5			5			5			5			5			5			5	5				5			5	5				5			5		5
Threats to the species (**out of 15**)				6			6			6			6			6			6			6	6				6			6	6				6			6		6
Species mobility capacity (**out of 10**)				8			8			8			8			8			8			8	8				8			8	8				8			8		8
Site Context Score				45			45			45			45			45			45			45	45				45			45	45				45			45		45
MAX Site Context Score				*56*			*56*			*56*			*56*			*56*			*56*			*56*	*56*				*56*			*56*	*56*				*56*			*56*		*56*
Site Context Score - out of 3																							**2.41**									**2.41**									**2.41**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		**10**
		No		Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10		**15**
		Not habitat	Dispersal	Foraging		Breeding
Approximate density (per ha)	Score	0	10	**20**		30
		0%				
Role/importance of species population on site*	Score *(Total from supplementary table below)*	0	5		**10**	15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)	55					
SRR Score (out of 4)	***3.14***					

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	**10**
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	**5**
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	**15**
		No	Yes/ Possibly
*Near the limit of the species range	Score	**0**	15
		No	Yes

	Offset Management Unit 1: RE 11.3.35 | 11.3.35a | 11.3.25b			
Final habitat quality score (weighted)	**AU2**	**AU3**	**AU4**	**Average/Final**
Site Condition score (out of 3)	1.28	1.24	1.14	1.22
Site Context Score (out of 3)	2.41	2.41	2.41	2.41
Species Stocking Rate Score (out of 4)	3.14	3.14	3.14	3.14
Habitat Quality score (out of 10)	6.83	6.79	6.69	6.77
Assessment Unit area (ha) in offset site	149.1	34.3	21.8	205.2
Total OMZ area (ha)	205.2	205.2	205.2	205.2
Size Weighting	0.727	0.167	0.106	1.0
Weighted Habitat Quality Score	***4.96***	***1.13***	***0.71***	***6.81***

BTF OFFSET MANAGEMENT ZONE 2: 11.3.31 Remnant																			
Assessment Unit - Regional Ecosystem	AU 1 - RE 11.3.31 Remnant																		
Site Reference	Benchmark	K3			Z12			H4			H5			H6			Average %	Average
	11.3.31 (Adjusted)	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Score
Recruitment of woody perennial species in EDL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Native plant species richness - trees	3.0	1.0	33.3	2.5	1.0	33.3	2.5	3.0	100.0	5.0	1.0	33.3	2.5	0.0	0.0	0.0	40.0	2.5
Native plant species richness - shrubs	0.0	0.0	0.0	0.0	1.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Native plant species richness - grasses	6.0	4.0	66.7	2.5	5.0	83.3	2.5	7.0	116.7	5.0	4.0	66.7	2.5	5.0	83.3	2.5	83.3	3.0
Native plant species richness - forbs	7.0	3.0	42.9	2.5	7.0	100.0	5.0	2.0	28.6	2.5	1.0	14.3	0.0	1.0	14.3	0.0	40.0	2.0
Tree canopy height (average of emergent, canopy, sub-canopy)	14.0	15.0	107.1	5.0	19.0	135.7	5.0	17.0	121.4	5.0	10.0	71.4	5.0	0.0	0.0	0.0	87.1	4.0
Tree canopy cover (average of emergent, canopy, sub-canopy)	10.0	0.0	0.0	0.0	16.6	166.0	5.0	17.0	0.0	0.0	39.1	390.5	5.0	0.0	0.0	0.0	111.3	2.0
Shrub canopy cover	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Native Perenial grass cover	77.0	0.0	0.0	0.0	3.0	3.9	0.0	68.0	88.3	3.0	15.0	19.5	1.0	52.0	67.5	3.0	35.8	1.4
Organic litter	12.0	6.6	55.0	5.0	7.4	61.7	5.0	30.0	250.0	3.0	58.8	489.6	3.0	0.0	0.0	0.0	171.3	3.2
Large trees (euc plus non-euc)	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	100.0	15.0	0.0	0.0	0.0	20.0	3.0
Coarse woody debris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	82.7	0.0	0.0	82.1	0.0	0.0	26.0	0.0	3.0	14.0	0.0	5.0	65.0	0.0	0.0	0.0	1.6
Quality and availability of food and foraging habitat				10.0			6.7			13.3			13.3			13.3		11.3
Quality and availability of shelter and breeding ground				15.0			15.0			20.0			12.5			15.0		15.5
Site Condition Score				42.5			46.7			59.8			64.8			33.8		49.5
MAX Site Condition Score				*110*			*110*			*110*			*110*			*110*		*110*
Site Condition Score - out of 3																		**1.35**
Site Context																		
Size of patch (HA) (**out of 10**)				10			10			10			10			10		10
Connectedness (**out of 5**)				5			5			5			5			5		5
Context (**out of 5**)				5			5			5			5			5		5
Ecological Corridors (**out of 6**)				6			6			6			6			6		6
Role of site location to species overall population in the state (**out of 5**)				5			5			5			5			5		5
Threats to the species (**out of 15**)				6			6			6			6			6		6
Species mobility capacity (**out of 10**)				8			8			8			8			8		8
Site Context Score				45			45			45			45			45		45
MAX Site Context Score				*56*			*56*			*56*			*56*			*56*		*56*
Site Context Score - out of 3																		**2.41**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5	**10**		
		No	Yes - adjacent	Yes - on site		
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	**15**	
		Not habitat	Dispersal	Foraging	Breeding	
Approximate density (per ha)	Score	0	10	**20**	30	
		0%				
Role/importance of species population on site*	Score (*Total from supplementary table below*)	0	5	**10**	15	
		0	5 - 15	20 - 35	40 - 45	
Total SRR score (out of 70)	55					
SRR Score (out of 4)	***3.14***					

***SSR Supplementary Table**			
*Key source population for breeding	Score	**0**	10
		No	Yes/ Possibly
*Key source population for dispersal	Score	**0**	5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	**0**	15
		No	Yes/ Possibly
*Near the limit of the species range	Score	**0**	15
		No	Yes

	Offset Management Unit 2: RE 11.3.31 Remnant	
Final habitat quality score (weighted)	**AU1**	**Average/Final**
Site Condition score (out of 3)	1.35	1.35
Site Context Score (out of 3)	2.41	2.41
Species Stocking Rate Score (out of 4)	3.14	3.14
Habitat Quality score (out of 10)	6.90	6.90
Assessment Unit area (ha) in offset site	72.0	72.0
Total OMZ area (ha)	72.0	72.0
Size Weighting	1.00	1.0
Weighted Habitat Quality Score		***6.90***

BTF OFFSET MANAGEMENT ZONE 3: 11.3.31 Non-remnant

Assessment Unit - Regional Ecosystem	AU 6 RE 11.3.31 Non-Remnant																													
Site Reference	Benchmark	K1			K2			Z10			Z11			Z13			H9			H11			H12			H13			Average %	Average
	11.3.31	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score		
Recruitment of woody perennial species in EDL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Native plant species richness - trees	3.0	1.0	33.3	2.5	1.0	33.3	2.5	0.0	0.0	0.0	1.0	33.3	2.5	1.0	33.3	2.5	3.0	100.0	5.0	3.0	100.0	5.0	2.0	66.7	2.5	2.0	66.7	2.5	51.9	2.8
Native plant species richness - shrubs	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Native plant species richness - grasses	6.0	4.0	66.7	2.5	4.0	66.7	2.5	5.0	83.3	2.5	12.0	200.0	5.0	9.0	150.0	5.0	4.0	66.7	2.5	3.0	50.0	2.5	4.0	66.7	2.5	6.0	100.0	5.0	94.4	3.3
Native plant species richness - forbs	7.0	6.0	85.7	2.5	4.0	57.1	2.5	11.0	157.1	5.0	5.0	71.4	2.5	7.0	100.0	5.0	1.0	14.3	0.0	3.0	42.9	2.5	0.0	0.0	0.0	2.0	28.6	2.5	61.9	2.5
Tree canopy height (average of emergent, canopy, sub-canopy)	14.0	17.0	121.4	5.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	100.0	5.0	18.0	128.6	5.0	8.0	57.1	5.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	85.7	5.0	54.8	2.8
Tree canopy cover (average of emergent, canopy, sub-canopy)	10.0	7.1	71.0	5.0	6.0	60.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	57.0	3.0	26.2	262.0	5.0	-1.0	-10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.9	1.8
Shrub canopy cover	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Native Perenial grass cover	77.0	3.4	4.4	0.0	8.6	11.2	1.0	21.2	27.5	1.0	13.0	16.9	1.0	3.0	3.9	0.0	80.0	103.9	5.0	25.0	32.5	1.0	37.5	48.7	1.0	47.5	61.7	3.0	34.5	1.4
Organic litter	12.0	6.0	50.0	5.0	2.0	16.7	3.0	2.0	16.7	3.0	0.2	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	1.2
Large trees (euc plus non-euc)	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	200.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	100.0	15.0	1.0	100.0	15.0	0.0	0.0	0.0	1.0	100.0	15.0	55.6	6.7
Coarse woody debris	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	88.0		0.0	88.0		0.0	73.7		0.0	69.6		0.0	65.9		0.0	62.5		0.0	70.0		0.0	72.0		0.0	61.0		0.0	0.0	0.0
Quality and availability of food and foraging habitat				10.0			8.3			13.3			11.7			11.7			15.0			15.0			13.3			15.0		12.6
Quality and availability of shelter and breeding ground				7.5			7.5			7.5			15.0			15.0			17.5			12.5			10.0			10.0		11.4
Site Condition Score				40.0			30.3			47.3			42.7			47.2			70.0			53.5			29.3			58.0		46.5
MAX Site Condition Score				*110*			*110*			*110*			*110*			*110*			*110*			*110*			*110*			*110*		*110*
Site Condition Score - out of 3																														**1.27**
Site Context																														
Size of patch (HA) (**out of 10**)				10			10			10			10			10			10			10			10			10		10
Connectedness (**out of 5**)				5			5			5			5			5			5			5			5			5		5
Context (**out of 5**)				5			5			5			5			5			5			5			5			5		5
Ecological Corridors (**out of 6**)				6			6			6			6			6			6			6			6			6		6
Role of site location to species overall population in the state (**out of 5**)				5			5			5			5			5			5			5			5			5		5
Threats to the species (**out of 15**)				6			6			6			6			6			6			6			6			6		6
Species mobility capacity (**out of 10**)				8			8			8			8			8			8			8			8			8		8
Site Context Score				45																										45
MAX Site Context Score				*56*			*56*			*56*			*56*			*56*			*56*			*56*			*56*			*56*		*56*
Site Context Score - out of 3																														**2.41**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		**10**
		No		Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10		**15**
		Not habitat	Dispersal	Foraging		Breeding
Approximate density (per ha)	Score	0	10	**20**		30
		0%				
Role/importance of species population on site*	Score (*Total from supplementary table*	0	5		**10**	15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)	55					
SRR Score (out of 4)	*3.14*					

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	10
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	15
		No	Yes/ Possibly
*Near the limit of the species range	Score	0	15
		No	Yes

	Offset Management Unit 2: RE 11.3.31 Non-remnant	
Final habitat quality score (weighted)	**AU6**	**Average/Final**
Site Condition score (out of 3)	1.27	1.27
Site Context Score (out of 3)	2.41	2.41
Species Stocking Rate Score (out of 4)	3.14	3.14
Habitat Quality score (out of 10)	6.82	6.82
Assessment Unit area (ha) in offset site	95.0	95.0
Total OMZ area (ha)	95.0	95.0
Size Weighting	1.00	1.0
Weighted Habitat Quality Score	***6.82***	***6.82***

Appendix B

EPBC Act Offset Assessment Calculator (OMZ 1, 2, 3 & combined)

OMZ-1

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	BTF	Area *(Hectares)*	77.78	Preliminary Documentation
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*		0.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	Overal shelter and foraging habitat score: 11.25 to 20 / 25 based on HQAR	17.02	HQAR
Condition of habitat Change in habitat condition, but no change in extent	Yes	Overal habitat quality score: 5.19 to 6.63 / 10 based on HQAR.	6.63	HQAR

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00		
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%		
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of habitat	Yes	0.00	Revegetation	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	205.2	Risk of loss without offset *(%)*	5%	Risk of loss with offset *(%)*	0%	10.26	85%	8.72	6.87	Overall net present value	31.60	To be determined	Preliminary documentation
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	7	Future quality without offset *(scale of 0-10)*	6	Future quality with offset *(scale of 0-10)*	8	2.00	85%	1.70	1.34	% of impact offset	0.00%		
								Future area without offset	194.9	Future area with offset	205.2			Minimum (90%) direct offset requirement met?			FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	17.02	Revegetation	20	3	30%	87%	0.57	85%	0.48	0.38	0.00%	FALSE		
Condition of habitat Change in habitat condition, but no change in extent	Yes	6.63	Revegetation	20	3	28%	74%	0.46	85%	0.39	0.31	0.00%	FALSE		

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE		
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE		
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE		

Summary

					Cost ($)		
Protected matter attributes	**Quantum of impact**	**Net present value**	**% of impact offset**	**Direct offset adequate?**	**Direct offset**	**Other compensatory measures**	**Total**
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	17.02	0.38	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	6.63	0.31	0.00	FALSE	0.00	N/A	0.00
Area of habitat	0.00	31.60	0.00	FALSE	To be deter	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

OMZ-2

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	BTF	Area *(Hectares)*	77.78	Preliminary Documentation
			Quality *(Scale 0-10)*	7	
		Total quantum of impact *(Adjusted Hectares)*		54.45	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	Overal shelter and foraging habitat score: 11.25 to 20 / 25 based on HQAR	17.02	HQAR
Condition of habitat Change in habitat condition, but no change in extent	Yes	Overal habitat quality score: 5.19 to 6.63 / 10 based on HQAR.	6.63	HQAR

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00		
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%		
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of habitat	Yes	54.45	Revegetation	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	73	Risk of loss without offset *(%)*	5%	Risk of loss with offset *(%)*	0%	3.65	85%	3.10	2.44	Overall net present value	11.24	To be determined	Preliminary documentation
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	7	Future quality without offset *(scale of 0-10)*	6	Future quality with offset *(scale of 0-10)*	8	2.00	85%	1.70	1.34	% of impact offset	20.65%		
								Future area without offset	69.4	Future area with offset	73.0			Minimum (90%) direct offset requirement met?			FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	17.02	Revegetation	20		30%	87%	0.57	85%	0.48	0.38	0.00%	FALSE		
Condition of habitat Change in habitat condition, but no change in extent	Yes	6.63	Revegetation	20	3	28%	74%	0.46	85%	0.39	0.31	0.00%	FALSE		

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE		
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE		
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE		

Summary

					Cost ($)		
Protected matter attributes	**Quantum of impact**	**Net present value**	**% of impact offset**	**Direct offset adequate?**	**Direct offset**	**Other compensatory measures**	**Total**
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	17.02	0.38	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	6.63	0.31	0.00	FALSE	0.00	N/A	0.00
Area of habitat	54.45	11.24	0.21	FALSE	To be deter	#VALUE!	#VALUE!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#VALUE!**	**#VALUE!**

OMZ-3

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	BTF	Area *(Hectares)*	77.78	Preliminary Documentation
			Quality *(Scale 0-10)*	7	
		Total quantum of impact *(Adjusted Hectares)*		54.45	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	Overal shelter and foraging habitat score: 11.25 to 20 / 25 based on HQAR	17.02	HQAR
Condition of habitat Change in habitat condition, but no change in extent	Yes	Overal habitat quality score: 5.19 to 6.63 / 10 based on HQAR.	6.63	HQAR

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00		
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%		
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of habitat	Yes	54.45	Revegetation	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	95	Risk of loss without offset *(%)*	5%	Risk of loss with offset *(%)*	0%	4.75	85%	4.04	3.18	Overall net present value	14.63	To be determined	Preliminary documentation
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	7	Future quality without offset *(scale of 0-10)*	6	Future quality with offset *(scale of 0-10)*	8	2.00	85%	1.70	1.34	% of impact offset	26.87%		
								Future area without offset	90.3	Future area with offset	95.0			Minimum (90%) direct offset requirement met?			FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	17.02	Revegetation	20		30%	87%	0.57	85%	0.48	0.38	0.00%	FALSE		
Condition of habitat Change in habitat condition, but no change in extent	Yes	6.63	Revegetation	20	3	28%	74%	0.46	85%	0.39	0.31	0.00%	FALSE		

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE		
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE		
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE		

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	17.02	0.38	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	6.63	0.31	0.00	FALSE	0.00	N/A	0.00
Area of habitat	54.45	14.63	0.27	FALSE	To be deter	#VALUE!	#VALUE!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#VALUE!**	**#VALUE!**

Combined

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
2 October 2012

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	BTF	Area *(Hectares)*	77.78	Preliminary Documentation
			Quality *(Scale 0-10)*	7	
		Total quantum of impact *(Adjusted Hectares)*		54.45	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	Overal shelter and foraging habitat score: 11.25 to 20 / 25 based on HQAR	17.02	HQAR
Condition of habitat Change in habitat condition, but no change in extent	Yes	Overal habitat quality score: 5.19 to 6.63 / 10 based on HQAR.	6.63	HQAR

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00		
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%		
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*	Information source
Area of habitat	Yes	54.45	Revegetation	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	373.2	Risk of loss without offset *(%)*	5%	Risk of loss with offset *(%)*	0%	18.66	85%	15.86	12.49	Overall net present value	57.47	To be determined	Preliminary documentation
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	7	Future quality without offset *(scale of 0-10)*	6	Future quality with offset *(scale of 0-10)*	8	2.00	85%	1.70	1.34	% of impact offset	105.56%		
								Future area without offset	354.5	Future area with offset	373.2			Minimum (90%) direct offset requirement met?			TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Number of features e.g. Nest hollows, habitat trees	Yes	17.02	Revegetation	20	3	30%	87%	0.57	85%	0.48	0.38	0.00%	FALSE		
Condition of habitat Change in habitat condition, but no change in extent	Yes	6.63	Revegetation	20	3	28%	74%	0.46	85%	0.39	0.31	0.00%	FALSE		

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*	Information source
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE		
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE		
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE		

Summary

					Cost ($)		
Protected matter attributes	**Quantum of impact**	**Net present value**	**% of impact offset**	**Direct offset adequate?**	**Direct offset**	**Other compensatory measures**	**Total**
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	17.02	0.38	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	6.63	0.31	0.00	FALSE	0.00	N/A	0.00
Area of habitat	54.45	57.47	1.06	TRUE	To be deter	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**