



NORTHERN STAR
RESOURCES LIMITED

**Carosue Dam TSF Cell 4
Exempt East Location 55 (EEL55)
Offset Management Plan**

EPBC 2021/9026

7 August 2023

Version No. 4

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Declaration of Accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both.

I am authorised to bind the approval holder to this declaration, and I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed:  _____

Full Name: John Albrecht _____

Position: Site Senior Executive

Organisation: Northern Star (Carosue Dam) Pty Ltd

Date: 7 August 2023

Executive Summary

Northern Star (Carosue Dam) Pty Ltd has approval to develop a new cell (Cell 4) at its Tailings Storage Facility (TSF) at Carosue Dam Operations. Approval to construct Cell 4 was granted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22 November 2022 (EPBC 2021/9026).

Construction of Cell 4 was predicted to impact 152.6 ha of Malleefowl (*Leipoa ocellata*) habitat and Conditions 2 of EPBC 2021/9026 requires the approval holder to control and legally secure the EEL55 offset to compensate for significant residual impacts to Malleefowl. Land parcel “EEL55”, located approximately 140 km south-west of Cell 4, is an 800 ha parcel of freehold land owned by Northern Star and known to contain Malleefowl habitat.

This Offset Management Plan (OMP) has been prepared to meet the requirements of Condition 3 of EPBC 2021/9026, which states:

*‘To compensate for significant residual **impacts to Malleefowl** the approval holder must submit, within 6 months of **commencement of action**, an Offset Management Plan to the **Department** for the **Minister’s** approval. The Offset Management Plan must, to the satisfaction of the **Minister**, meet the requirements specified in Attachment D. The approval holder must implement the approved Offset Management Plan for the life of the approval.’*

This Offset Management Plan (OMP) has been prepared to meet the requirements of Condition 3 of EPBC 2021/9026. The objectives of this OMP are to:

- Protect Malleefowl habitat in EEL55 from future development by securing the site for long term conservation management.
- Improve Malleefowl habitat quality within the site through implementation of management measures.

The management approach outlined in this OMP has incorporated recovery actions identified in the National Malleefowl Recovery Plan (Benshemesh, 2007). The primary strategies to achieve these objectives are:

- Securing a conservation covenant over EEL55
- Environmental management to improve Malleefowl habitat quality at the site, including:
 - Exclusion of grazing
 - Feral predator control
 - Bushfire prevention
 - Weed control

Monitoring will be undertaken to assess performance of these measures and an adaptive management approach will be used to implement contingency actions until completion criteria are achieved. The implementation of these measures will establish the offset site as a conservation area with high quality Malleefowl habitat.



Contents

Executive Summary	ii
Contents	iii
1.0 Introduction	1
1.1 Background	1
1.2 Purpose and Scope	1
1.3 Objective	2
2.0 Project Description	9
3.0 Impacts of Controlled Action	11
3.1 Habitat Quality	11
3.2 Malleefowl Mounds	11
4.0 Offset Site Values	14
4.1 Property Details and Land Use	14
4.2 Climate	14
4.3 Bioregional Context	14
4.4 Land Systems and Surface Geology	17
4.5 Habitat Assessment	17
4.6 Vegetation Condition	17
4.7 Malleefowl (<i>Leipoa ocellata</i>)	22
4.8 Distribution and Habitat	22
4.9 Conservation Status	22
4.10 Introduced Fauna	22
4.11 Malleefowl Mounds and Malleefowl Activity on EEL55	23
4.12 Habitat Quality Assessment Score	28
5.0 Risk Assessment	32
6.0 Management Measures	37
6.1 Management Action 1 - Protection Mechanism	41
6.2 Management Action 2 - Exclusion of grazing	41
6.3 Management Action 3 - Predator Management	42
6.4 Management Action 4 - Bushfire Prevention	43
6.5 Management Action 5 - Weed Management	44
7.0 Monitoring	45
8.0 Audit, Review, Adaptive Management, Reporting and Data Management	46
8.1 Environmental Auditing	46

8.2	Offset Management Plan Review	46
8.3	Adaptive Management	46
8.4	Reporting.....	47
8.4.1	Annual Compliance Reporting	47
8.4.2	Reporting Non-Compliance	47
8.5	Data Management	47
9.0	Environmental Roles and Responsibilities	49
10.0	Environmental Training	50
11.0	Emergency Contacts and Procedures.....	51
12.0	Glossary	52
13.0	References.....	53

List of Tables

Table 1: EPBC 2021/9026 Offset Management Plan requirements	3
Table 2: Implementation schedule for the TSF	10
Table 3: Habitat assessment of impact site	12
Table 4: Habitat Summary within EEL55	18
Table 5: Observed feral predator activity	23
Table 6: Single Malleefowl Mound observed by Phoenix Environmental Services (2022).....	24
Table 7: Malleefowl Mounds surveyed by Alec Holm and Associates (2022).	25
Table 8:Habitat quality assessment for offset site EEL55	29
Table 9: Qualitative measures to determine an event likelihood rating	32
Table 10: Qualitative measures to determine an event consequence.....	32
Table 11: Risk Rating Matrix.....	33
Table 12: Risk Assessment and management	34
Table 13:Implementation Schedule, Completion Criteria and Monitoring	39
Table 14:Environmental roles and responsibilities	49

List of Figures

Figure 1: Malleefowl habitat at impact site.....	13
Figure 2: Exempt East Location 55.....	15
Figure 3: Surrounding Land Use to offset site	16
Figure 4 Malleefowl habitat suitability	21

List of Appendices

Appendix A – Offset Compliance Assessment Example	56
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1.0 Introduction

1.1 Background

Northern Star (Carosue Dam) Pty Ltd has approval to develop a new cell (Cell 4) at its Tailings Storage Facility (TSF) at Carosue Dam Operations. Approval to construct Cell 4 was granted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22 November 2022 (EPBC 2021/9026).

Construction of Cell 4 was predicted to impact 152.6 ha of Malleefowl (*Leipoa ocellata*) habitat and Conditions 2 of EPBC 2021/9026 requires Northern Star to control and legally secure the EEL55 offset to compensate for significant residual impacts to Malleefowl. Land parcel “EEL55”, located approximately 140 km south-west of Carosue Dam Operations, is an 800 ha parcel of Freehold land owned by Northern Star and known to contain Malleefowl habitat.

Condition 3 of EPBC 2021/9026 requires the approval holder to submit an Offset Management Plan (OMP) to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for the Minister's approval. Condition 3 states:

*‘To compensate for significant residual **impacts to Malleefowl** the approval holder must submit, within 6 months of **commencement of action**, an Offset Management Plan to the **Department** for the **Minister’s** approval. The Offset Management Plan must, to the satisfaction of the **Minister**, meet the requirements specified in Attachment D. The approval holder must implement the approved Offset Management Plan for the life of the approval.’*

1.2 Purpose and Scope

This Offset Management Plan (OMP) has been prepared to meet the requirements of Northern Star's Offset Proposal and provides the details on land management actions, completion criteria, monitoring and reporting.

The purpose of this Offset Management Plan is to:

- Provide a framework for the implementation, monitoring and management actions required, to ensure the offset site is secure and protected from potential impacts associated with mining, agriculture, predation and other environmental risks that have the potential to degrade the environmental values at the site.
- Provide and maintain protection of 800 ha of land including 755.2 ha of Malleefowl habitat to improve conservation outcomes for Malleefowl within EEL55.

This OMP has been prepared to meet the requirements of Condition 3 of EPBC 2021/9026. A summary of relevant sections in the OMP is provided in Table 1: EPBC 2021/9026 Offset Management Plan requirements

The OMP was prepared in accordance with the Environmental Management Plan Guidelines (Commonwealth of Australia, 2014) by suitably qualified environmental experts: Kiera Mews (Principal Environmental Advisor), Karina Tedesco (Environment Manager) and Cliff Bennison (Senior Environmental Advisor). These personnel have over 50 years' combined experience in environmental management.

1.3 Objective

The objectives of the OMP are to:

- Protect the offset site from future development by securing the site for long term conservation management.
- Improve Malleefowl habitat quality within the site through implementation of management measures.

Table 1: EPBC 2021/9026 Offset Management Plan requirements

Item	EPBC 2021/9026 Offset Management Plan requirements	Section	Page No.	Commitment
	EPBC Approval Condition			
2	To compensate for residual significant impacts to Malleefowl, the approval holder must:	Sections 6.1, 7.0 & 8.4	31, 34, 38, 42	
	a. control the EEL55 offset site within 6 months of the date of this approval decision,			Northern Star have control of the EEL55 offset site.
	b. legally secure the EEL55 offset site within 6 months of the date of Offset Management Plan being accepted by the Department,			Northern Star commit to legally securing the EEL55 offset site within 6 months of the date of OMP acceptance by the Department.
	c. within 10 business days of legally securing the EEL55 offset site, provide the Department with: <ul style="list-style-type: none"> i. written evidence demonstrating that the EEL55 offset site has been ii. legally secured, and iii. shapefiles and offset attributes of the EEL55 offset site, 			Northern Star will provide written evidence to the Department, including shapefiles and offset attributes, demonstrating that the EEL55 offset site has been legally secured, within 10 business days of securing offset site.
	d. once the EEL55 offset site has been legally secured, report annually on the presence of Malleefowl at the EEL55 offset site for the life of the approval, and			Northern Star will report annually on the presence of Malleefowl at EEL55 for the life of the approval.
	e. provide the Department with evidence demonstrating the presence of Malleefowl at the EEL55 offset site within 5 years of this approval.			Northern Star will provide the Department evidence of Malleefowl at the EEL55 offset site within 5 years of this approval.



Item	EPBC 2021/9026 Offset Management Plan requirements	Section	Page No.	Commitment
3	To compensate for significant residual impacts to Malleefowl the approval holder must submit, within 6 months of commencement of the Action, an Offset Management Plan to the Department for the Minister's approval. The Offset Management Plan must, to the satisfaction of the Minister, meet the requirements specified in Attachment D [see below]. The approval holder must implement the approved Offset Management Plan for the life of the approval.	Section 6	29	Northern Star commit to submit an Offset Management Plan (this document) to the Department for approval. The approved Offset Management Plan will be implemented for the life of the approval.
6	<p>If the approval holder is unable to demonstrate the presence of Malleefowl at the EEL55 offset site within 7 years of this approval, the approval holder must:</p> <ul style="list-style-type: none"> a. submit an alternative offset site proposal, which meets the requirements of the Environmental Offsets Policy, to the Department, b. submit an Offset Management Plan for the alternative offset site in accordance with the requirement specified in Attachment D. c. not recommence undertaking the Action unless the Offset Management Plan for the alternative offset site is approved in writing by the Minister, d. legally secure the alternative offset site, and e. within 6 months of the Offset Management Plan for the alternative offset site being approved by the Minister, provide the Department with: <ul style="list-style-type: none"> i. written evidence to the demonstrating that the alternative offset site has been legally secured, and ii. shapefiles and offset attributes of the alternative offset site. 	Section 7 & Section 8 .3	38, 41	<p>Northern Star commit to finding and legally securing an alternative suitable offset site if unable to demonstrate the presence of Malleefowl at EEL55 within 7 years of this approval.</p> <p>If required, an alternative Offset Site Proposal and associated Offset Management Plan will be submitted to the Department for approval in accordance with Condition 6a-b.</p> <p>The action will not be recommenced until the alternative offset site is approved by the Minister in accordance with Condition 6c.</p>

Item	EPBC 2021/9026 Offset Management Plan requirements	Section	Page No.	Commitment
	<p>Note: The approval holder should commence seeking an alternative offset site if the presence of Malleefowl at the EEL55 offset site has not been demonstrated 5 years after this approval decision and initiate discussions with the Department about what measures it should take to avoid any interruption to implementation of the approved Action. The alternative offset site proposal and Offset Management Plan for the alternative offset site may be submitted to the Department well before 7 years after this approval decision.</p>			
<p>7 - 8</p>	<p>Revised Action Management Plans</p> <p>7. If the approval holder wishes to carry out any activity otherwise than in accordance with the Action management plans referred to in these conditions, the approval holder must submit to the Department for the Minister's written approval a revised version of that plan. The approval holder must not commence the varied activity until the Minister has approved the revised plan in writing. If the Minister approves such a revised plan, that version of the plan must be implemented in place of the version previously approved.</p> <p>8. If the Minister believes that it is necessary or convenient for the better protection of Malleefowl to do so, the Minister may request that the approval holder make specified revisions to a plan referred to in these conditions and submit the revised plan for the Minister's written approval. The approval holder must comply with any such request.</p>	<p>Section 8.2 & 8.3</p>	<p>41</p>	<p>Northern Star will submit a revised Management Plan to the Department for approval where activities within the plan have changed. Northern Star will not commence the varied activity until the revised plan has been approved in accordance with Condition 7.</p> <p>Northern Star will submit a revised plan if requested by the Minister in accordance with Condition 8.</p>
<p>9-13</p>	<p>Submission and Publication of Plans</p>	<p>Section 8.5</p>	<p>42</p>	<p>Northern Star commit to the submission and publication of all plans required by</p>



Item	EPBC 2021/9026 Offset Management Plan requirements	Section	Page No.	Commitment
	<p>9. The approval holder must submit all plans required by these conditions electronically to the Department.</p> <p>10. Unless otherwise agreed to in writing by the Minister, the approval holder must publish each plan on the website within 15 business days of the date:</p> <ul style="list-style-type: none"> a. of this approval, if the version of the plan to be implemented is specified in these conditions; or b. the plan is approved by the Minister in writing, if the plan requires the approval of the Minister; or c. the plan is submitted to the Department in accordance with a requirement of these conditions, if the plan does not require the approval of the Minister <p>11. The approval holder must keep all published plans required by these conditions on the website until the expiry date of this approval.</p> <p>12. The approval holder is required to exclude or redact sensitive ecological data from plans published on the website or otherwise provided to a member of the public.</p> <p>13. If sensitive ecological data is excluded or redacted from a plan in accordance with condition 12, the approval holder must notify the Department in writing what exclusions and redactions have been made in the version published on the website.</p>			<p>these conditions in accordance with Conditions 9-13.</p>
Information Requested in EPBC 2021/9026 Attachment D				
a)	be prepared in accordance with the Environmental Management Plan Guidelines	Section 1.0	1	

Item	EPBC 2021/9026 Offset Management Plan requirements	Section	Page No.	Commitment
b)	be prepared by a suitably qualified expert	Section 1.1	1	
c)	include a summary of the residual impacts to Malleefowl that the Offset Management Plan proposes to compensate for, including: <ul style="list-style-type: none"> i. the size of the area, in hectares, ii. the habitat quality of the area, and iii. the total number of suitable nest mounds identified during any pre-clearance survey 	Section 3.0	11	
d)	reference the EPBC Act approval conditions to which the Offset Management Plan refers	Section 1.1 Table 1: EPBC 2021/9026 Offset Management Plan requirements	1, 3	
e)	include maps, prepared in accordance with the Maps Guide, of the proposed offset site(s)	Figure 4	13 15 16 21	

Item	EPBC 2021/9026 Offset Management Plan requirements	Section	Page No.	Commitment
f)	include details of the offset site(s), including: i. the size of the area, in hectares, ii. site survey results, iii. the habitat quality of the site(s), and, iv. the environmental values of the site(s), including the total number of nesting mounds within the site(s)	Section 4.0	14	
g)	detail measurable ecological outcomes and include commitments to achieve those outcomes	Section 6.0	37	
h)	detail management actions, and the timing of those actions, that will be implemented to achieve the ecological outcomes	Section 6.0	37	
i)	include a program to monitor the implementation of the plan, including the progress of the plan towards achieving ecological outcomes	Section 7.0	36	
j)	detail a schedule to review and report on the implementation of the plan, including a progress assessment towards the attainment of ecological outcomes	Section 8.0	46	
k)	include a risk assessment which evaluates the risk of the plan not achieving the ecological outcomes	Section 5.0 Table 12	34	
l)	propose corrective actions, with measurable performance indicators and trigger values to ensure that ecological outcomes are attained and maintained once attained.	Section 5.0 Table 12	34	

2.0 Project Description

Expansion of the TSF is required to ensure continued operation of the Carosue Dam Project, located approximately 120km north-east of Kalgoorlie in the Pinjin region of the Eastern Goldfields. To continue processing operations into the future, Northern Star has developed a 10 year TSF permitting design, which includes the construction of an additional cell adjacent to the existing TSF.

The project occurs on existing mining tenure (M28/269 & M31/295) and will involve 217.3 ha of vegetation clearing within a 229.1 ha development envelope, of which 52.5ha is considered suitable (used for foraging and cover) and 100.1 ha critical (used for breeding and foraging) Malleefowl habitat. Within the development envelope, 11.8 ha has been previously cleared.

Table 2 provides a summary of the indicative implementation schedule for construction, operation, and decommissioning/rehabilitation of the TSF.

Table 2: Implementation schedule for the TSF

Phase	Activity Description	Start Date	Completion Date	Duration
Construction	Clearing of impact area	November 2022	December 2022	1 month
	Construction of embankments	November 2022	July 2023	8 months
	Compaction & construction of roads	November 2022	July 2023	9 months
	Redirection of surface water flows through construction of drainage channels	November 2022	September 2023	11 months
Operations	Commence deposition of tailings into Cell 4	January 2024	January 2031	7 years
	Maintenance of infrastructure	January 2024	January 2031	7 years
	Twice daily inspections of pipelines during operation	January 2024	January 2031	7 years
	Road maintenance including dust suppression and surface grading	August 2022	January 2031	9 years
Decommissioning & Rehabilitation	Cease deposition and allow consolidation and drying of tailings material	January 2031	July 2031	6 months
	Reshape and batter slopes to <math><18^\circ</math>;	August 2031	January 2032	6 months
	Cap top surface with competent rock;	January 2032	March 2032	3 months
	Respread topsoil;	March 2032	April 2032	2 months
	Rip on the contour	April 2032	April 2032	1 month
	Seed with local native species	April 2032	April 2032	1 month
	Rehabilitation monitoring	September 2032	September 2042	10 years

3.0 Impacts of Controlled Action

The controlling provisions for EPBC 2021/9026 comprise Listed threatened species and ecological communities (section 18 and 18A of the EPBC Act). Specifically, the project has potential to result in significant residual impacts to Malleefowl (*Leipoa ocellata*), which is listed as Vulnerable under the EPBC Act.

Significant residual impacts to Malleefowl include:

- clearing up to 152.6 ha of suitable Malleefowl habitat, comprising 100.1 ha of critical habitat suitable for breeding and foraging, and 52.5 ha of supporting habitat suitable for foraging and shelter.
- Removal of up to seven inactive nest mounds, including four recently inactive mounds and three abandoned mounds.

3.1 Habitat Quality

In accordance with the EPBC offsets assessment guide (How to use the Offsets assessment guide) three components, i) site condition, ii) site context and iii) stocking rate, were rated to provide an assessment of habitat within the disturbance envelope (Table 3).

The basis for habitat assessment was a targeted Malleefowl survey conducted by Alexander Holm & Associates in 2021 (Alex Holm and Associates, 2022a), and vegetation surveys conducted over the impact area and surrounds reported in Alexander Holm & Associates (2012, 2019). These surveys provide spatially-described information within land units each occupying a similar topographic position with similar vegetation and soil type.

Within the 229.1 ha disturbance envelope, 11.8 ha has been previously cleared for a haul road, minor access roads and boundary fencing, leaving 217.3 ha of habitat for assessment. Of this, alluvial plains with chenopods (land unit 5a) occupy 29%; acacia shrubland (land unit 4a) 26%; spinifex sandplain (land unit 4d) 21%; basalt foot slopes (land unit 2b) 20%; sandy rises with spinifex (land unit 1d) 3% and laterite rises (land unit 2a) 1%.

When indices for habitat condition, context and Malleefowl stocking rate are combined, sandy rises with spinifex (land unit 1d) score the highest for Malleefowl habitat followed by acacia shrublands (land unit 4a), spinifex sandplain (land unit 4d), and basalt footslopes (land unit 2b) which all rate highly. Alluvial plains (land unit 5a) and lateritic rises (land unit 2a) are of limited value.

After combining area-adjusted ratings for each land unit and expressing this as a ratio of the maximum possible score of 10, the total habitat score for the disturbance envelope is 5.41. The habitat quality assessment for the disturbance envelope is summarised in Table 3.

3.2 Malleefowl Mounds

The action will result in removal of seven inactive mounds. Most of these are located within the 100.1ha of acacia shrublands and basalt footslopes, which are critical habitat suitable for breeding and foraging by Malleefowl. While two nesting mounds were found in spinifex sandplain and sandy rises with spinifex, these mounds were restricted to small, favoured locations without spinifex, where acacias occur and are not prone to fire.

Elsewhere, there were no nesting mounds where spinifex is the dominant ground cover and fire is common. Consequently, these spinifex-dominated systems covering 52.5 ha are considered primarily habitat for foraging and cover.

Alluvial plains and lateritic rises, covering 64.8 ha which make up the balance of the disturbance envelope, are of limited value as Malleefowl habitat (Alexander Holm & Associates 2022a).

Table 3: Habitat assessment of impact site

Assessment component	Factors	Proportional score (out of 10)	Summary
Site condition	Vegetation condition Site attributes	1.67	Disturbed by recent mining and historic pastoral grazing. Roads, vehicle tracks fragment the area. Spinifex sandplain and sandy rises with spinifex are mostly in excellent condition and the remainder mostly in fair condition. Litter abundance is optimal in acacia-dominated units and minimal elsewhere. Sandy loam soils suitable for mound construction are prevalent in all land units except alluvial plains. No evidence of predators noted.
Site context	Movement patterns of the species Proximity of the site in relation to other suitable areas of habitat	2.05	Connectivity with surrounding landscapes is compromised by mining infrastructure and pastoral fencing. Site is part of a regionally significant contiguous suitable habitat; records on site for Malleefowl within last 6-10 years; site is within known distribution of species.
Malleefowl stocking rate	Occurrence of nesting mounds.	1.69	No active Malleefowl nesting mounds. Previously active mounds found within acacia shrublands, basalt footslopes, and in localised sites within spinifex units. Lateritic rises unsuitable
Overall site rating		5.41	

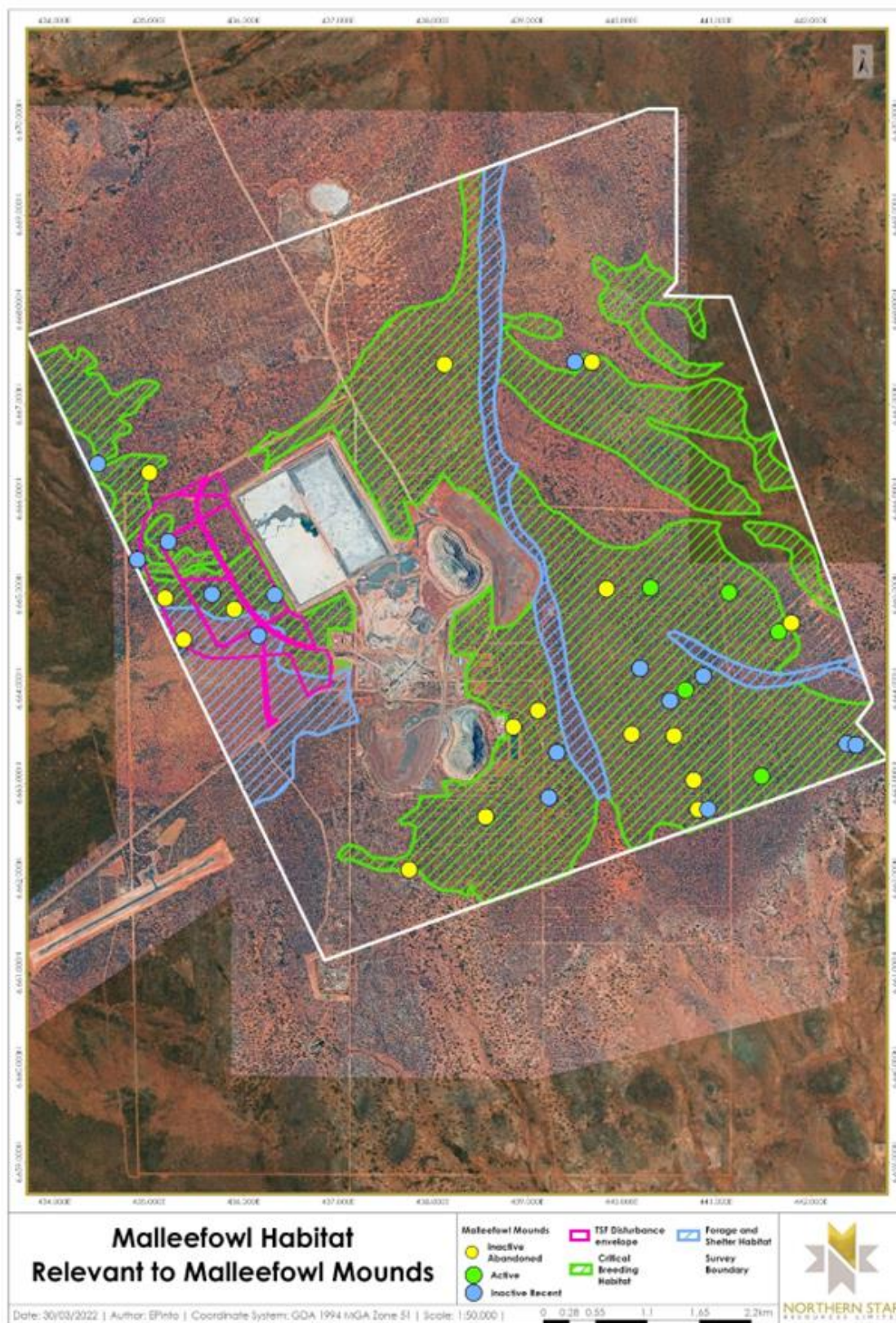


Figure 1: Malleefowl habitat at impact site

4.0 Offset Site Values

4.1 Property Details and Land Use

Land parcel "EEL55" has been identified as a suitable offset and is located approximately 140 km south-west of the Project in the City of Kalgoorlie Boulder (Figure 2). The site is 800 ha of Freehold land owned by Northern Star and holds a special land category 'Exempt East Location' (EEL) allowing mining and/or exploration activities to occur on the land under agreement, exempt from the provisions of the *Mining Act 1978* and *Mining Regulations 1981*.

EEL55 is surrounded by mining and exploration tenure, and pastoral leases (Figure 3). A pastoral licence agreement overlies the offset site. There has previously been no formal protection and/or management over EEL55 for the purposes of conservation, to prevent pastoral, mining and/or exploration activities.

The proposed offset site is located within a continuous patch of vegetation and abuts the Department Biodiversity, Conservation and Attractions (DBCA) managed Yallari Timber Reserve, providing a connection to regional Malleefowl habitat. The Scahill Timber Reserve is approximately 8 km southwest from EEL55 as shown in Figure 3.

4.2 Climate

The Goldfields region is arid to semi-arid with average annual rainfall decreasing from about 250 mm in the south-west to 200 mm in the north-east. The area experiences hot summers and mild winters with cold nights. Rainfall varies widely between years and droughts are common. Remnants of tropical cyclones occasionally bring heavy summer rain and can cause flooding to the area. The area transitions between desert summer and winter dominated rainfall and desert: non-seasonal bioclimatic (Alex Holm and Associates 2022b).

Malleefowl have been recorded within EEL55 and surrounding areas, suggesting the climate supports Malleefowl occurrence.

4.3 Bioregional Context

The proposed offset site is located within the Murchison bioregion at the western edge of the Eastern Goldfields subregion (Phoenix Environmental Services 2022).

The Eastern Goldfields subregion is characterised by:

- subdued relief comprised of undulating plains interrupted by low hills and ridges in the west and a horst in the east
- playa lakes associated with the remnants of an ancient major drainage line
- calcareous earths that cover much of the plains and greenstone areas
- vegetation dominated by Mallees, Acacia thickets, shrubland heaths, Eucalyptus woodlands and dwarf samphire shrublands
- land use dominated by Unallocated Crown Land, Crown Reserves and grazing.

The proposed offset site is located within a continuous patch of vegetation and abuts the DBCA managed Yallari Timber Reserve.

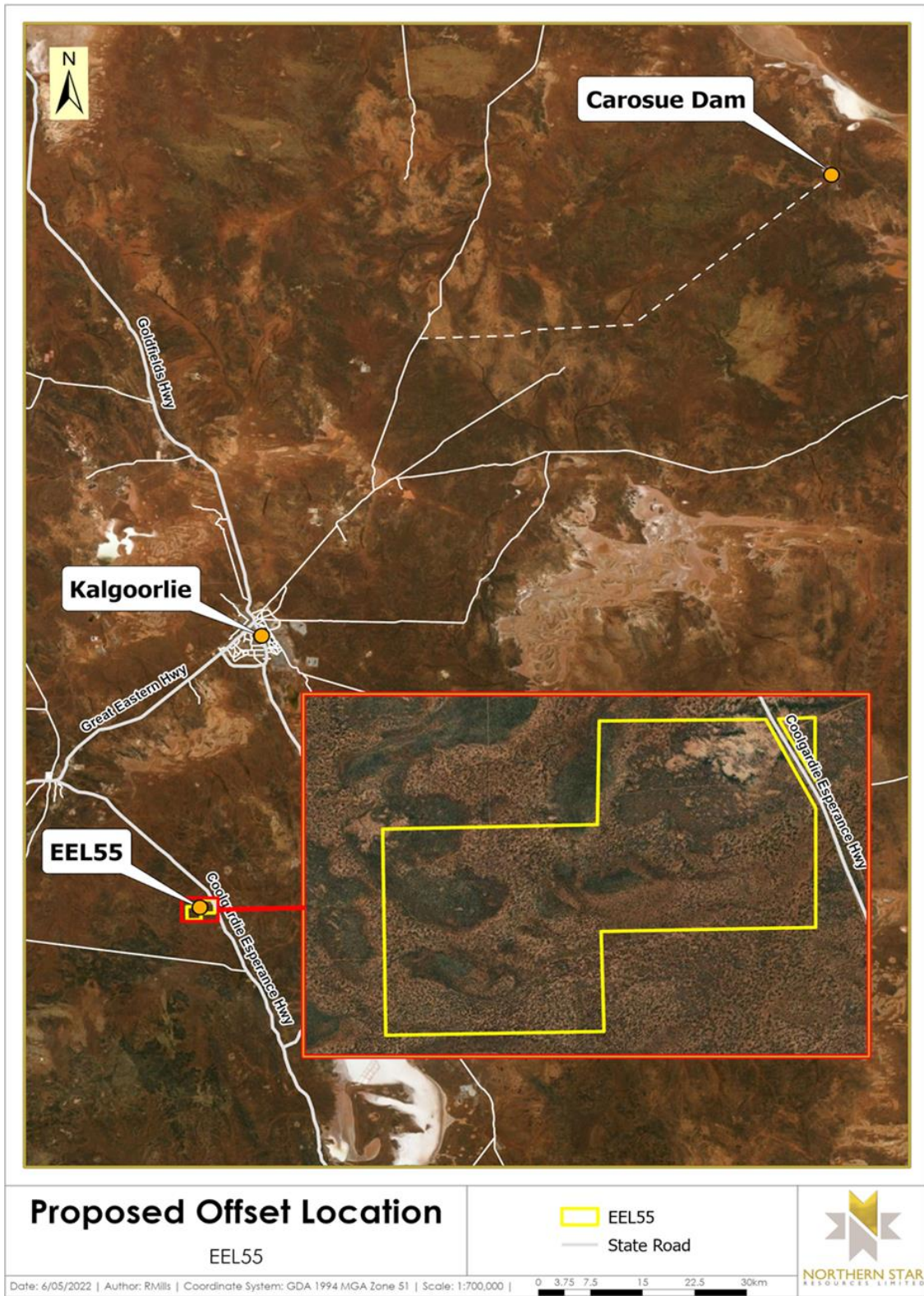


Figure 2: Exempt East Location 55

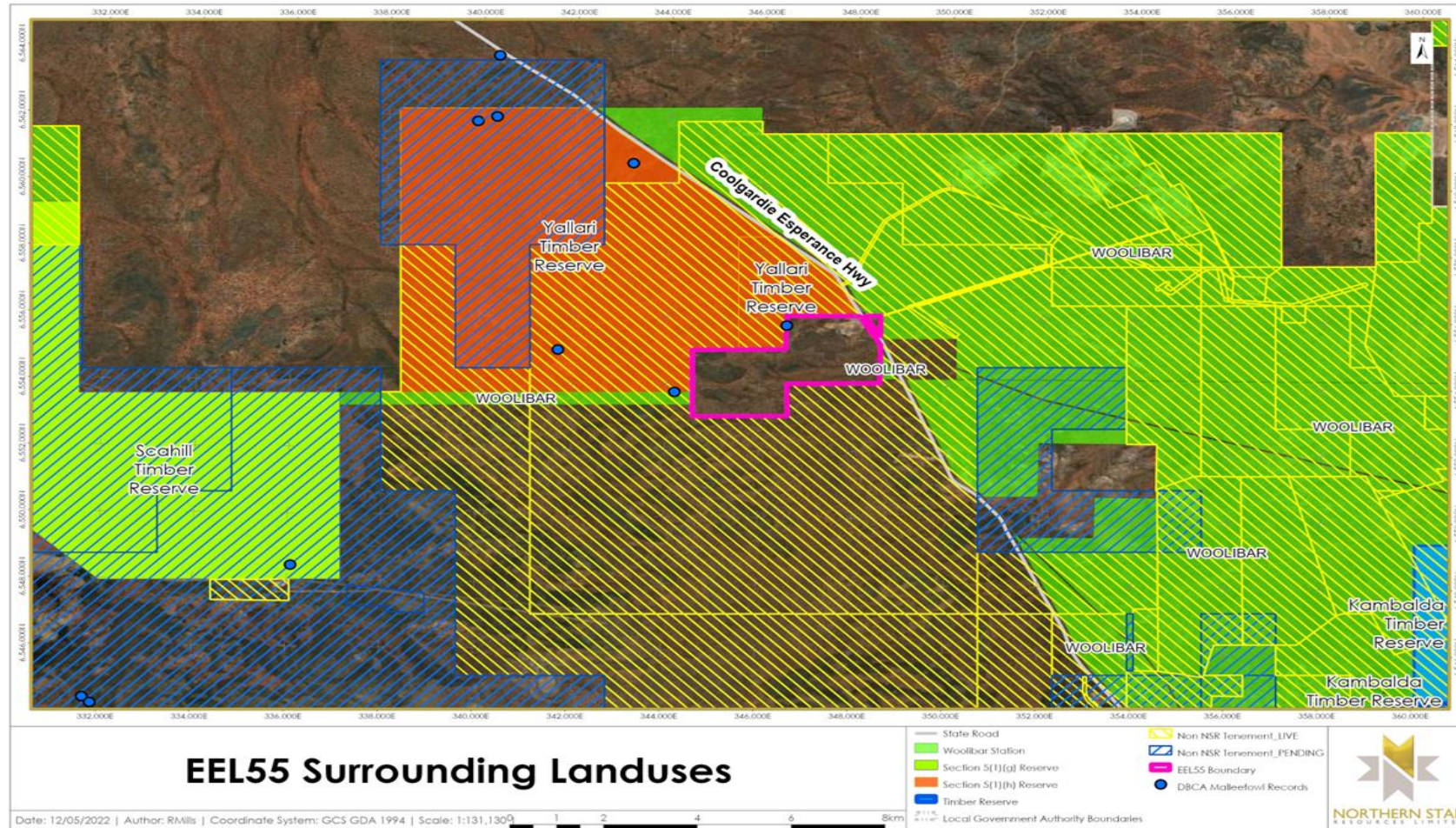


Figure 3: Surrounding Land Use to offset site

4.4 Land Systems and Surface Geology

The Department of Primary Industries and Regional Development (DPIRD) undertakes land system mapping for Western Australia using a nesting soil-landscape mapping hierarchy. While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage. EEL55 intersects two land systems, of which Mx41 is the most extensive and colluvium 38491 and Depot Granodiorite H dominated surface geology (Phoenix Environmental Services 2022).

Land Systems and Surface Geology within the EEL55 include:

Land systems

- Mx41: Flat to undulating pediments marginal to unit AC1; granitic rock outcrop; some low escarpments
- Mx42: Broad flat to undulating valleys with isolated granitic, and

Surface geology:

- colluvium 38491: Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite
- Depot Granodiorite H: Hornblende granodiorite and tonalite with scattered microcline phenocrysts; mafic granite

4.5 Habitat Assessment

Phoenix Environmental Services (2022) completed a fauna habitat assessment across EEL55 to determine the quality of Malleefowl habitat within EEL55. Habitat type Eucalyptus woodland (405.5 ha, 50.7%) dominated the site followed by Acacia shrubland (309 ha, 38.6%), then Melaleuca shrubland (40.7 ha, 0.3%). A total of 1 ha was cleared land and 44.4 ha (5.5%) was attributed to a granite extrusion. Habitat structure was considered suitable across the site, with Acacia shrubland and Melaleuca shrubland providing highest suitability for Malleefowl (Phoenix Environmental Services, 2022 and Alexander Holm & Associates, 2022b).


EEL55 and the surrounding Yallari Timber Reserve are important to the regional Malleefowl population. Following an initial survey by Phoenix Environmental Services (2022), EEL55 was considered likely to contain Malleefowl populations based on the presence of suitable habitat and historic records within and/or immediately adjacent to the sites. As a result, an additional targeted survey was conducted over EEL55 by Alexander Holm and Associates (2022b), during which both active and inactive Malleefowl mounds and evidence of recent Malleefowl activity were identified, demonstrating the suitability of EEL55 as an offset site.



Based on these surveys, the resulting assessment of habitat quality for Malleefowl within EEL55 is detailed in Table 4. Malleefowl habitat suitability has been mapped in Figure 4.


4.6 Vegetation Condition

Vegetation condition for EEL55 was considered pristine, showing no signs of anthropogenic disturbance or damage. There was observed old drums and PVC piping left on the site from historical unauthorised access, however, was not seen to be impacting vegetation (Phoenix Environmental Services 2022).

Table 4: Habitat Summary within EEL55

Habitat type	Description	Extent in EEL55 (ha and %)	Contains suitable Malleefowl habitat	Representative photograph
Eucalyptus woodland	<p>Tall, open <i>Eucalyptus</i> woodland tall, isolated <i>Acacia</i> shrubs over variably present shrubs of <i>Eremophila</i>, <i>Melaleuca</i>, <i>Senna</i>, <i>Maireana sedifolia</i> and <i>Phebalium</i> sp..</p> <p>Contains suitable Malleefowl habitat.</p>	405.5 (50.7)	Yes	

Habitat type	Description	Extent in EEL55 (ha and %)	Contains suitable Malleefowl habitat	Representative photograph
Acacia shrubland	<p>Tall Acacia shrubland over variable mid open shrubland of <i>Dodonaea</i> sp., <i>Phebalium</i> and <i>Sclerolaena</i> sp., over low <i>Rhagodia</i>, <i>Senna</i>, and <i>Maireana</i> shrubs.</p> <p>Contains suitable Malleefowl habitat.</p>	309.0 (38.6)	Yes	
Granite extrusion forbland	<p>Large open granite extrusion with isolated Acacia and <i>Hakea</i> shrubs over forbland of <i>Helipterum roseum</i>, <i>Maireana</i> and <i>Sclerolaena</i> sp..</p> <p>Does not contain suitable Malleefowl habitat.</p>	44.4 (5.5)	No	

Habitat type	Description	Extent in EEL55 (ha and %)	Contains suitable Malleefowl habitat	Representative photograph
Melaleuca shrubland	<p>Melaleuca shrubland over low scattered <i>Maireana sedifolia</i>, <i>Grevillea</i> and <i>Atriplex</i> sp. (saltbush), <i>Phebalium</i> and greybush.</p> <p>Contains suitable Malleefowl habitat.</p>	40.7 (5.1)	Yes	
Cleared	<p>Roads, agricultural infrastructure such as watering holes etc.</p> <p>Does not contain suitable Malleefowl habitat.</p>	1.0 (0.1)	No	NA
Total		800.6		

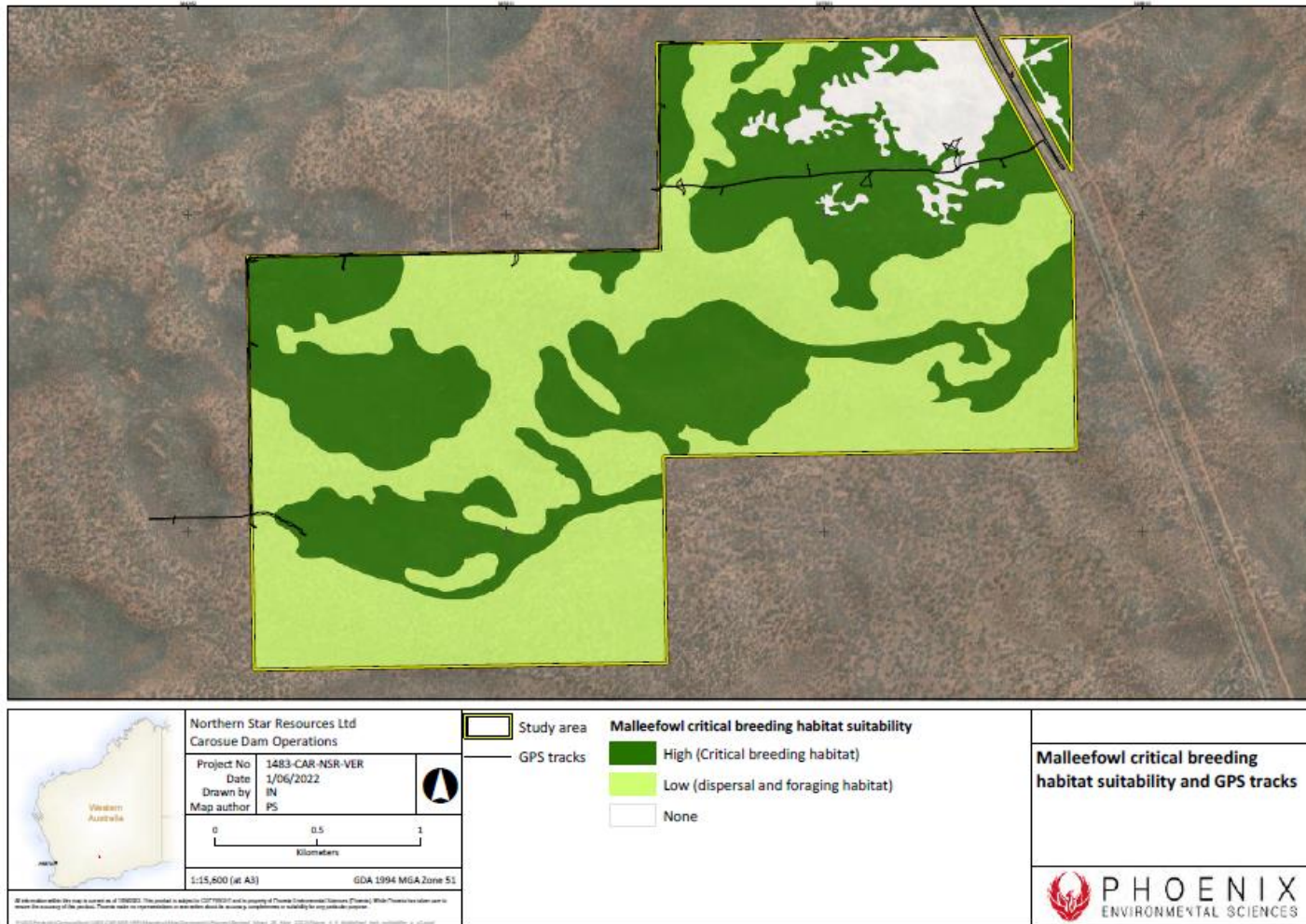


Figure 4 Malleefowl habitat suitability

4.7 Malleefowl (*Leipoa ocellata*)

Malleefowl (*Leipoa ocellata*) are a stocky ground-dwelling bird, that rarely flies, belonging to the family Megapodiidae that build distinctive nests comprised of larger mounds built from soil and leaf litter to incubate their eggs. Breeding season usually begins in September when egg laying begins and ends in late January. During this time, the male bird remains at the mound constantly re-working it. Breeding pairs are monogamous, will pair for life and will breed in the same area using existing mounds. Chicks typically begin hatching in November, with most chicks emerging from mounds by January, however it has been noted that in some seasons hatching may continue until March (Benshemesh, 2007). Malleefowl (eggs and chicks) are threatened by predation, habitat clearing, isolation due to habitat fragmentation and increased wildfires.

4.8 Distribution and Habitat

Historically, Malleefowl have been found in semi-arid mallee shrublands and woodlands across southern Australia, however although the species is still found across its range, its remaining populations are highly fragmented due to extensive land clearing (Department of Parks and Wildlife, 2016). Malleefowl habitat is generally found in shrublands and low woodlands dominated by mallee. In Western Australia, habitat generally consists of Acacia dominated shrublands and occasionally woodlands dominated by eucalypts. Habitat areas require a sandy substrate and abundance of leaf litter for the construction of mounds. Studies have found density of birds is greater in areas of higher rainfall, on more fertile soils and where shrub diversity is greatest. Habitats characterised by numerous food plants (especially leguminous shrubs and herbs), a dense canopy cover and open ground layer are generally associated with high breeding densities. Malleefowl also prefer long unburnt country (Benshemesh, 2007). Thick vegetative corridors are beneficial to Malleefowl that predominantly disperse on foot.

At the broader land system scale, most nesting mounds are within Deadman land system characterised by level to gently undulating plains with casuarina-acacia shrublands which include the Malleefowl-favoured acacia shrublands of land units 4a and 4b. Nesting mounds occur on footslopes of Lawrence and Leopold land systems characterised by low hills with eucalypt or acacia woodlands with halophytic under-shrubs which include basalt hill footslopes of land unit 2b. Nesting mounds also occur in favoured locations within the extensive Kirgella land system characterised by sandplain supporting spinifex and acacia/eucalypt shrublands which is dominated by spinifex sandplain of land unit 4d (Alexander Holm and Associates 2022).

Deadman, Kirgella, Lawrence and Leonora land systems occupy approximately 18,000 ha within 10 km of the disturbance envelope and provide potential habitat for Malleefowl. Kirgella land system, which extends up to 40 km to the west and is contiguous with the disturbance envelope, occupies two thirds of the potential habitat (Alexander Holm and Associates 2022).

4.9 Conservation Status

The Malleefowl is one of three mound – building birds species in Australia and is recognized as a threatened species under State and Commonwealth legislation. The Malleefowl is listed as Vulnerable fauna under the EPBC Act. The species is also listed as Vulnerable under the *Biodiversity Conservation Act 2016 (WA)*.

4.10 Introduced Fauna

Predation by feral animals (fox, cats, and dingos) is a key factor contributing to the decline of Malleefowl species due to mortality (Bode et al., 2011 and Benshemesh J, 2007). Feral animals

are known to take Malleefowl at all stages of the bird's life cycle, reducing recruitment of Malleefowl into populations (Benshemesh J, 2007). Table 5 outlines evidence of predators observed at EEL55 during surveys.

Table 5: Observed feral predator activity

Species	Record of Evidence	Comments
Cat (<i>Felis catus</i>)	Scats/tracks	Recorded on the track (NS030). (Phoenix Environmental Services, 2022). Alexander Holm and Associates (2022b) confirmed presence of Cat.
Dog/Dingo	Tracks	Fresh tracks of wild dog/dingo were noted at several locations throughout the assessment by Alexander Holm and Associates (2022b).

4.11 Malleefowl Mounds and Malleefowl Activity on EEL55





Phoenix Environmental Services (2022) has undertaken a fauna habitat assessment across EEL55 to determine the quality of Malleefowl habitat within the proposed offset which included a desktop review identifying 120 Malleefowl records within a 40 km radius of the site. During the habitat assessment one degraded Malleefowl mound was recorded on the northwest boundary track of EEL55 situated within Acacia Shrubland (Table 6).

Further survey work undertaken by Alexander Holm and Associates (2022b) identified twelve nesting mounds of which two were active, one inactive recent, two inactive abandoned and seven long unused. Fresh tracks of one adult and one juvenile Malleefowl were found either within or nearby 'acacia shrubland' (Table 7).

Table 6: Single Malleefowl Mound observed by Phoenix Environmental Services (2022)

Site	Latitude	Longitude	Mound Status
NS026	-31.1220	121.3908	<p>Long unused: Evidence of an extended period of inactivity such as dense shrubs or trees growing from hollow or mound very degraded/poorly formed. Highly unlikely to become Active in the future.</p> 

Table 7: Malleefowl Mounds surveyed by Alec Holm and Associates (2022).

Details	Photo	Details	Photo
<p>EEL55_01</p> <p>Outer rim: 3.85m Inner rim; 2.45m Depth: 0.26m Long unused</p>		<p>EEL55_03</p> <p>Outer rim: 3.7m Inner rim; 2.1m Depth: 0.13m Long unused</p>	
<p>EEL55_02</p> <p>Outer rim: 3.12m Inner rim; 1.70m Depth: 0.12m Long unused</p>		<p>EEL55_04</p> <p>Outer rim: 2.80m Inner rim; 1.50m Depth: 0.12m Long unused</p>	

EEL55_05

Outer rim: 4.00m
Inner rim; 2.67m
Depth: 0.30m
Long unused



EEL55_07

Outer rim: 4.20m
Inner rim; 2.35m
Depth: 0.26m
Inactive abandoned



EEL55_06

Outer rim: 4.45m
Inner rim; 2.45m
Depth: 0.41m
Active



EEL55_08

Outer rim: 3.70m
Inner rim; 2.65m
Depth: 0.30m
Long unused



EEL55_09

Outer rim: 4.35m

Inner rim; 1.80m

Depth: 0.41m

Active



EEL55_011

Outer rim: 5.30m

Inner rim; 3.45m

Depth: 0.31m

Long unused



EEL55_010

Outer rim: 4.55m

Inner rim; 2.00m

Depth: 0.33m

Inactive recent



EEL55_012

Outer rim: 5.00m

Inner rim; 2.75m

Depth: 0.18m

Long unused



4.12 Habitat Quality Assessment Score

A habitat quality score for EEL55 was calculated using the three components laid out in the EPBC Act Offsets Assessment Guide (DSEWPC, 2012): Malleefowl stocking rate, Site condition and Site context.

These were combined in a framework that differentiates, describes and weights these components to derive a Habitat quality score out of a maximum value of ten. Scores for these components were calculated for each habitat type within each individual site. The framework gave a greater weighting to species presence, with Site context and Site condition each making up 30% of the total score and Malleefowl stocking rate making up the final 40%. The total score for each habitat type was then weighted based on the proportion of that habitat type within the offset site. These scores were then summed, resulting in an overall habitat score out of ten, which aligns with the EPBC Act Offset Assessment Guide (DSEWPC, 2012).

A summary of the habitat quality score for EEL55 is provided below in Table 8.

Table 8: Habitat quality assessment for offset site EEL55

Factor	Score	Condition/details	Habitat type					
			Eucalyptus woodland	Acacia shrubland	Granite extrusion	Melaleuca shrubland	Cleared	
Site condition								
Vegetation condition	5	Pristine	4.7	4.8	5.0	5.0	0.0	
	4	Excellent						
	3	Very good						
	2	Good						
	1	Degraded						
	0	Completely degraded						
Score out of 3			2.8	2.9	3.0	3.0	0.0	
Habitat structure - Diversity of habitat species present - Habitat features (Based on Malleefowl habitat assessment)	3	High suitability (score of 6-8/8)	2.0	3.0	0.0	3.0	0.0	
	2	Medium suitability (score of 5/8)						
	1	Low suitability (score of 4/8)						
	0	Not suitable (score of 0-3/8)						
Score out of 3			2.0	3.0	0.0	3.0	0.0	
Feral Predator Activity	3	Not detected in targeted survey	0.0	1.0	2.0	3.0	3.0	
	2	Low (one record within habitat)						
	1	Medium (Multiple records of single species or single records of more than one species)						
	0	High (Multiple records of more than one species)						
Score out of 3			0.0	1.0	2.0	3.0	3.0	
		Overall score out of 3 (weighted so Vegetation condition = 40% of total and Habitat structure = 60% of total)	3	1.7	2.5	1.3	3.0	0.8
Site context								
Movement patterns of Malleefowl	3	Site is part of a regionally large contiguous suitable habitat; records on the site for Malleefowl within last 5 years; site is within known distribution of Malleefowl and has connectivity with protected areas.	3.0	3.0	1.0	2.5	1.0	

Factor	Score	Condition/details	Habitat type				
			Eucalyptus woodland	Acacia shrubland	Granite extrusion	Melaleuca shrubland	Cleared
Proximity of the site in relation to other suitable areas of habitat Overall population or extent of Malleefowl	2.5	Site is part of a regionally significant contiguous suitable habitat; records on site or immediately adjacent (within 3 km) for Malleefowl within last 6-10 years; site is within known distribution of Malleefowl.					
	2	Site is part of a contiguous suitable habitat; Malleefowl records on site or adjacent (within 5 km) to site within last 6- 10 years; site is within known distribution of Malleefowl.					
	1.5	Site is part of a contiguous suitable habitat; Malleefowl records on or adjacent (within 10 km) to site within last 6-10 years; site is located within known distribution of Malleefowl.					
	1	Site is unsuitable or isolated from suitable habitat. Malleefowl records on site or in region (within 10 km) within last 10 years and Malleefowl are capable of migrating to site. Site is located within known distribution of Malleefowl.					
	0.5	Site is unsuitable or isolated from suitable habitat. Records on site or in region (within 10 km) within last 10 years and species are capable of migrating to site. Site is not located within known distribution of species.					
	0	Site is unsuitable or isolated from suitable habitat. No Malleefowl records on site or in region (within 10 km) within last 10 years and Malleefowl unlikely to migrate to site.					
Score out of 3			3.0	3.0	1.0	2.5	1.0
Malleefowl stocking rate							
Known presence	4	Malleefowl recorded on site annually for three consecutive years, includes evidence of active mounds and other signs of recent/current presence such as direct sightings of birds, fresh tracks and scats.	3.0	3.0	0.0	2.0	0.0
	3	Malleefowl recorded on site, includes evidence of active mounds and other signs of recent/current presence such as direct sightings of birds, fresh tracks and scats.					
	2	Malleefowl previously recorded on site, no recent activity in mounds, sightings or tracks and scats.					
	1	No records of Malleefowl on site, within known range of Malleefowl, suitable habitat present.					
	0	Site outside current known range of Malleefowl or habitat is unsuitable.					
Score out of 4			3.0	3.0	0.0	2.0	0.0
Scores							
		Score out of 10 (before scaling)	7.7	8.5	2.3	7.5	1.8
		Habitat area (ha)	405.5	309.0	44.4	40.7	1.0
		Habitat area proportion	0.5	0.4	0.1	0.1	0.0

Factor	Score	Condition/details	Habitat type				
			Eucalyptus woodland	Acacia shrubland	Granite extrusion	Melaleuca shrubland	Cleared
		Scaled score (score scaled to proportion of tenement)	3.9	3.3	0.1	0.4	0.0
Final Habitat quality score out of 10			7.7				

5.0 Risk Assessment

A risk assessment for the key risks potentially impacting Malleefowl habitat and Malleefowl species at the offset site has been completed. This process allows identified risks to be evaluated and outlines mitigation measures and effectiveness of these measures. The Risk Assessment has been completed in accordance with the Australian/New Zealand standard 4360:1999 Risk Management. The risk assessment considers the likelihood of an impact event (Table 9) and the relative consequence of that event (Table 10) using the risk matrix provided in Table 11. The risk assessment is detailed in Table 12.

Table 9: Qualitative measures to determine an event likelihood rating

Likelihood	Description
A Almost Certain	The event is expected to occur in most circumstances, once per week.
B Likely	The event will probably occur in most circumstances, once per month.
C Possible	The event could possibly occur at some time, once per year.
D Unlikely	The event could possibly occur at some time but is unlikely, once every 5-10 years.
E Rare	The event may occur in exceptional circumstances >10 years.

Table 10: Qualitative measures to determine an event consequence

Consequence	Description
1 Very Low	None or insignificant impact to MNES (Malleefowl) with no effect on ecosystem function.
2 Minor	Moderate to minor impact to MNES (Malleefowl) resulting in a minor, recoverable impact.
3 Moderate	Minor and short-term impact to MNES expected, resulting in a moderate, recoverable impact.
4 Major	Long-term impact to MNES expected, resulting in a major, recoverable impact.
5 Catastrophic	Irreversible impact to MNES expected.

Table 11: Risk Rating Matrix

		CONSEQUENCES				
		Very Low 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
LIKELIHOOD						
A	Almost Certain	H (11)	H (16)	E (20)	E (23)	E (25)
B	Likely	M (7)	H (12)	H (17)	E (21)	E (24)
C	Possible	L (4)	M (8)	H (13)	E (18)	E (22)
D	Unlikely	L (2)	L (5)	M (9)	H (14)	E (19)
E	Rare	L (1)	L (3)	M (6)	M (10)	H (15)

Matrix Legend:

- E:** Extreme risk Immediate action required; further reduction needed. If not possible, Country Manager or COO approval required
- H:** High risk Senior management attention needed
- M:** Moderate risk Management responsibility must be specified
- L:** Low risk Manage by routine procedure

Table 12: Risk Assessment and management

Objective	Risk	Risk Factors	Likelihood	Consequence	Risk	Management Measures	Likelihood	Consequence	Residual Risk	Trigger	Corrective Actions
Protect Malleefowl habitat at the offset site	Loss of habitat from future land use e.g. exploration, mining, pastoralism.	<ul style="list-style-type: none"> The Goldfields is a highly prospective area for exploration and mining Much of the Goldfields is overlaid with Exploration, Miscellaneous and Mining tenure. Site has mineral resources that may become economical in future, subjecting land to exploration and mining activity Land subject to pastoral licence agreements Potential sale of property with unknown future land use 	B	4	E21	<ul style="list-style-type: none"> Placing land under a conservation covenant will protect the land from future mining or exploration activities that would contribute to significant habitat loss and degradation. Excise EEL55 from Pastoral Licence Agreement. 	E	1	L1	Conservation covenant not secured within 6 months post approval of the OMP.	<ul style="list-style-type: none"> Identify basis for not securing conservation covenant and either secure covenant for the site or an alternative mechanism, to protect the site from future land use impacts.
Improve Malleefowl habitat quality	Degradation of habitat from grazing.	<ul style="list-style-type: none"> Land has previously been, and is currently subject to, a pastoral licence agreement allowing stock grazing on the land contributing to degradation in habitat quality. Without an offset, pastoral activity can occur. 	C	4	E18	<ul style="list-style-type: none"> Fence installed to exclude stock animals. Excise EEL55 from Pastoral Licence Agreement. 	E	1	L1	Annual inspections show fence is damaged and integrity is compromised.	<ul style="list-style-type: none"> Repairs undertaken to maintain fence integrity
	Presence of foxes, cats and wild dogs increasing risk of predation	<ul style="list-style-type: none"> Evidence of cats recorded during the site survey. Evidence of wild dogs were recorded during surveys on EEL55 and EEL55 is adjacent to a known vermin cell (Goldfields Nullabor Rangelands Biosecurity Association) 	A	5	E25	<ul style="list-style-type: none"> Implementation of a predator control program in consultation with DBCA and relevant stakeholders (e.g. baiting) 	C	3	H13	Annual predator control monitoring shows predator activity unchanged or increased from baseline.	<ul style="list-style-type: none"> Increase of intensity, extent or type of predator control measures
	Unplanned fire causing habitat loss and degradation	<ul style="list-style-type: none"> Fire is becoming a more common occurrence throughout the state. Malleefowl populations are extremely susceptible to fire. 	D	4	H14	<ul style="list-style-type: none"> Firebreaks installed and maintained DFES on standby to respond to fire event. In the event of a fire event, weed and predator activity will be monitored and adaptive 	E	4	M10	Catastrophic bushfire impacts offset site.	<ul style="list-style-type: none"> Re-instate firebreaks and ensure fire protection is consistent with industry standards. Weed and predator populations will be monitored

Objective	Risk	Risk Factors	Initial Risk			Management Measures	Residual Risk			Trigger	Corrective Actions
			Likelihood	Consequence	Risk		Likelihood	Consequence	Residual Risk		
		<ul style="list-style-type: none"> Increased risk of weed encroachment in areas disturbed by fire. Increased predator activity post fire 				management implemented post the event.					and adaptive management implemented post the event.
	Encroachment of weeds into site reducing habitat quality	<ul style="list-style-type: none"> The Coolgardie-Esperance Hwy runs through the northwest corner of the site. This presents a risk of vehicles spreading weeds to the site if travelling through. 	B	1	M7	<ul style="list-style-type: none"> Implementation of weed control program. 	D	1	L2	Annual weed monitoring shows weed coverage increased.	<ul style="list-style-type: none"> Increase of intensity, extent or type of weed control
	Degradation from external factors such as climate change	<ul style="list-style-type: none"> Drying conditions resulting in more frequent fires 	D	3	M9	<ul style="list-style-type: none"> Firebreaks installed and maintained DFES on standby to respond to fire event. In the event of a fire event, weed and predator activity will be monitored and adaptive management implemented post the event. 	E	3	L	Catastrophic bushfire impacts offset site.	<ul style="list-style-type: none"> Re-instate firebreaks and ensure fire protection is consistent with industry standards. Weed and predator populations will be monitored and adaptive management implemented post the event.
	Failure to achieve competition criteria	<ul style="list-style-type: none"> Insufficient funding to implement plan. 	C	3	H13	<ul style="list-style-type: none"> Offset management costs incorporated into mine operation and closure budget, which has a similar timescale. 	E	3	M6	Budget does not include funding for environmental management of EEL55.	<ul style="list-style-type: none"> Secure additional funding.
		<ul style="list-style-type: none"> Efficacy of management measures is lower than anticipated 	C	3	H13	<ul style="list-style-type: none"> Monitoring programs implemented to assess environmental performance against performance targets and completion criteria. Corrective actions implemented when triggered (in line with this Table). Continue to consult relevant Departments, conservation bodies, expert consultants, and 	E	3	M6	Completion criteria not achieved i.e. Malleefowl habitat quality less than 8.7 ¹ after 20 years.	<ul style="list-style-type: none"> Implementation of additional management measures and/or identification of an alternative or additional offset.

¹ Methods for scoring Malleefowl habitat quality are outlined in Section 4.12 of this OMP and described further in Phoenix (2022) and Alexander Holms and Associates (2022b).

Objective	Risk	Risk Factors	Likelihood	Consequence	Risk	Management Measures	Likelihood	Consequence	Residual Risk	Trigger	Corrective Actions
						key stakeholders to ensure success of the offset site.					

6.0 Management Measures

This OMP will be implemented upon approval by the Minister and will be regularly reviewed to ensure its effectiveness of the implemented management measures. Northern Star will coordinate the ongoing and adaptive management of the offset for the life of the approval.

Preliminary management measures, completion criteria and associated monitoring has been outlined in the implementation schedule below (Table 13). The implementation schedule outlines management measure to be implemented, along with the completion criteria for monitoring performance of management. Thresholds and corrective actions for management are included in the risk assessment and management table.

Research suggests implementation of integrated management strategies can provide improved outcomes managing land for conservation of Malleefowl (Berry et al., no date). Accordingly, this OMP incorporates multiple management measures to mitigate key threats identified in the National Malleefowl Recovery Plan. The aim is to improve habitat quality through improving fire management and reducing pressure from grazing to preserve vegetation cover, increase food resources, retain soil moisture content, and protect the species from extreme temperatures.

Management measures implemented will include:

- Place a conservation covenant over EEL55 (Management Action 1)
- Exclusion of grazing (Management Action 2)
- Predator management (Management Action 3)
- Bushfire prevention and management with the installation of firebreaks (Management Action 4)
- Weed Management (Management Action 5)

These align with the following Actions in the Malleefowl Recovery Plan (Benshemesh, 2007).

- Action 1.1: Retain areas that support Malleefowl and protect them from incremental clearing, and report annually on clearing
- Action 2.1: Remove goats and sheep from reserves, or keep them at low numbers
- Action 2.3: Erect adequate fencing to protect Malleefowl habitat
- Action 3.1: Reduce the occurrence of large fires, and promote patchiness of fires, where Malleefowl conservation is a priority in large reserves
- Action 4.1: Record and centralise details of predator control in or near areas where there are estimates of Malleefowl abundance
- Action 4.3: Reduce fox numbers in large areas of native habitat where Malleefowl densities have declined, and predation is a likely explanation for such declines
- Action 9.1: Analyse and review monitoring data. Recommend improvements and develop site-specific management plans consistent with a national adaptive management design.
- Action 9.4: Facilitate and standardise monitoring and coordinate national monitoring effort
- Action 10.1: Detail the distribution of Malleefowl in remote areas of South Australia and Western Australia by field surveys, and describe the habitats in which Malleefowl are found
- Action 12.1: Describe the habitat requirements and preferences of Malleefowl, with a view to identifying important habitat components that may underlie variations in breeding densities

Table 13 outlines the Implementation Schedule, completion criteria and remedial actions to be taken should monitoring and review indicate completion criteria are not being met or are not on track to being met. It includes threshold triggers to ensure timely responses.

Table 13: Implementation Schedule, Completion Criteria and Monitoring

Objective	Completion Criteria	Management Measure	Performance Indicator	Timing	Monitoring Activity & Purpose	Methods	Parameters	Frequency	Threshold triggers and remedial actions	Evidence to demonstrate compliance
Secure protection of habitat for Malleefowl	Conservation covenant placed over EEL55	Establish conservation covenant over site (Management Action 1)	Conservation covenant documentation obtained	Legally secure the EEL55 offset site within 6 months of the date of Offset Management Plan being accepted by the Department	N/A	N/A	N/A	N/A	N/A	Conservation covenant will be registered on the Certificate of Title
Demonstrate adequacy of the offset	Malleefowl active within EEL55	Malleefowl Survey	Malleefowl presence is demonstrated at EEL55 within 5 years of this approval in accordance with Condition 2e	Within 5 years of the approval	<u>Malleefowl monitoring</u> Collect data on locations of Malleefowl mounds and evidence of activity to inform habitat quality assessments	LiDAR imagery and analysis Malleefowl mound monitoring in accordance with National Malleefowl Monitoring Manual (National Malleefowl Recovery Team, 2020)	Locations of mounds Malleefowl activity and mound status	5-yearly Annually	N/A – Malleefowl presence was identified in February 2023, demonstrating compliance with Condition 2e	Active Malleefowl mounds identified through breeding season surveys and/or records of scats, tracks, feathers and other evidence of Malleefowl activity Details to be provided within the Annual Compliance Report
Improve Malleefowl habitat quality	Future increase in Malleefowl habitat quality to at least 8.7 ²	Installation of perimeter fence (Management Action 2)	Fence is installed and maintained to exclude stock	Fence Installation within 12 months of approval of OMP For the life of the approval	<u>Infrastructure inspections</u> Inspect condition of fencing to confirm fence is suitable for excluding livestock	Visual inspections of fences	Fence condition	Biannually	Threshold Trigger: Fence is damaged and integrity is compromised Evidence of livestock within site Remedial Action: Repairs undertaken to maintain fence integrity Stock to be removed from site if present	Biannual visual inspection to verify fence intact Compliance checklist completed
		Implementation of a predator control program each year	Reduced evidence of predator activity from established baseline	Predator activity baseline is to be established within 12 months of	<u>Predator activity monitoring</u> Collect data on predator activity to inform habitat quality assessments and track	Record evidence of predators using methodology based on guidance by Hradsky, B. et al., (2021) and in consultation with	Predator activity and species	Annually	Threshold Trigger: Predator activity unchanged or increased from baseline	Survey by suitably qualified personnel, recording evidence of predator activity

² Methods for scoring Malleefowl habitat quality are outlined in Section 4.124.12 of this OMP and described further in Phoenix (2022) and Alexander Holms and Associates (2022b).

Objective	Completion Criteria	Management Measure	Performance Indicator	Timing	Monitoring Activity & Purpose	Methods	Parameters	Frequency	Threshold triggers and remedial actions	Evidence to demonstrate compliance
		(Management Action 3)		approval of this OMP For the life of the approval	trends in predator activity	relevant DBCA & other land managers			Investigate reasons for ineffective predator control Remedial Action: Increase of intensity, extent or type of predator control measures	
		Firebreaks are established and maintained around EEL55 (Management Action 4)	Firebreaks are in good condition and easily accessible in accordance with <i>Bushfires Act 1954</i>	Installation within 12 months of approval of this OMP For the life of the approval	<u>Infrastructure inspections</u> Inspect condition of firebreaks to confirm firebreak is in suitable condition to manage fire risk and inform maintenance program.	Visual inspections of firebreaks DFES Guide to Constructing and Maintaining Firebreaks	Firebreak condition	Biannually	Threshold Trigger: Firebreaks have been reported to contain vegetation Remedial Action: Removal of vegetation through mechanical or chemical means	Biannual visual inspection to verify firebreaks are clear Compliance checklist completed
		Weed Management Establish baseline weed percentage cover across the site (Management Action 5)	There will be no increase in weed coverage in EEL55 relative to baseline	Weed coverage baseline is to be established within 12 months of approval of this OMP For the life of the approval	<u>Vegetation and habitat monitoring</u> Monitor changes to vegetation condition and habitat quality. Monitor trends in weed occurrence	Vegetation condition and habitat assessments Visual inspections for weeds	Vegetation condition Habitat structure – diversity of habitat present and habitat features Weed cover and species composition	Biennially, for first 6 years and triennially thereafter Annually, and within 6 months of fire	Threshold Trigger: An increase in weed coverage in the EEL55 site relative to baseline Remedial Action: Further weed control measures to be undertaken including mechanical and chemical removal	Assessment by suitably qualified person Weeds are managed in accordance with Northern Star's Weed Management Procedure Site weed register

6.1 Management Action 1 - Protection Mechanism

Several mechanisms exist to provide legal protection of land for the purposes of conservation. One method includes an Agreement to Reserve which involves the land being set aside for the protection and management of vegetation under Section 30B of *Soil and Land Conservation Act 1945*. Under this mechanism, Section 30E of the Act allows provision for the Agreement to be varied or discharged. Alternatively, a Conservation Covenant under the *Soil and Land Conservation Act 1945* can be applied to ensure the protection of the Offset site.

Northern Star has confirmation the Soil Commissioner of Western Australia is willing to enter into a conservation covenant under the *Soil and Land Conservation Act 1945* with regards to EEL55 should this be accepted by DCCEEW as a suitable offset site. This mechanism provides protection of the land in perpetuity and is irrevocable. This conservation covenant will protect the land from impacts through clearing and/or degradation of the vegetation and habitat qualities over time, including grazing, mining and exploration disturbances.

This approach is consistent with Action 1.1 and 1.2 of the Malleefowl Recovery Plan, which aim to reduce habitat loss by retaining sites that support Malleefowl and protecting them from incremental clearing and encourage landholders to enter into conservation covenants and similar agreements.

Northern Star has provided a copy of the proposed draft conservation covenant under the *WA Soil and Land Conservation Act 1945* to the department prior to the document being signed and lodged with the WA Government and will submit a copy of the final covenant to the department.

6.2 Management Action 2 - Exclusion of grazing

EEL55 is currently subject to a Pastoral Licence Agreement under which Northern Star has since 2015 granted a licence to the neighbouring pastoralist to use areas of land including EEL55 for pastoral activities until 30 June 2030 (Pastoral Licence). Northern Star is confident that it will be able to secure an agreement from the pastoralist to amend the Pastoral Licence to excise EEL55 from the Pastoral Licence, with the result that no rights to pastoral activities will remain on EEL55. Northern Star will secure this amendment to the Licence should EEL55 be accepted as an offset and put under a conservation covenant. If it is not to become an environmental offset location, the rights under the Pastoral Licence will remain and are likely to lead to a reduced quality of habitat generally on EEL55.

Impacts of grazing on Malleefowl habitat are described in the National Malleefowl Recovery Plan (Benshemesh 2007; Commonwealth of Australia 2022). Grazing by livestock has been attributed to reduce breeding densities by 80% – 90% (Frith 1962) and herbivores have also been linked to impacting important food sources such as seeds (Commonwealth of Australia 2022). Feral goats have also been recognised as being abundant in some areas and may even more damaging. These are less common in other areas such as central Australia, but in these areas impacts from introduced herbivores such as cattle, rabbits and camels are recognised as a key threat.

Environmental impacts from grazing include changes to vegetation structure and composition, leaf litter availability, and soil moisture content and soil structure (Eldridge, D. et al., 2015). Although habitat requirements for Malleefowl are poorly understood, these factors are recognised as being important for the breeding success of Malleefowl (Stenhouse, P and Moseby, K. 2022).

In its initial site assessments, Phoenix Environmental Services identified that land with active pastoral activity (grazing and livestock use) had low suitability for Malleefowl habitat due to degraded habitat structures, these areas also had fewer Malleefowl records, increased feral animals and invasive weed species (Phoenix Environmental Services 2022a). The grazing had altered the vegetation structure and composition rendering the sparsely vegetated areas unsuitable, having impacted key habitat attributes critical for Malleefowl survival (foraging and breeding) such as sandy substrate, leaf litter, and canopy. This also increased predation pressure due to increased open areas (Phoenix Environmental Services 2022a). In addition, studies have indicated the altered vegetation structure and composition from pastoral activity reduced the abundance and diversity of food resources (seeds, flowers, and fruits) of understory shrubs and herbs, an important attribute for ongoing presence of Malleefowl (Benshemesh 2007; Wheeler 2018; Parsons 2008). The reduced abundance of food resources increased time spent foraging resulting in prolonged exposure to predators (Greenslade 1992 and Wheeler 2018). Evidence stated above is potentially a contributing factor to why there are fewer Malleefowl records at sites with active pastoral activity. This is consistent with other studies that indicated pastoral activity had profound eco-system changes and degradation, including altered vegetation structure and composition resulting in an increased predation risk (Hobbs 2001; Lunt et al. 2007; Benshemesh 2007; Saunder et al. 2003; Spooner & Lunt 2004).

Malleefowl have been shown to utilise disturbed habitat provided the habitat structure remains suitable (Wheeler 2018). Malleefowl presence was strongly related to habitat characteristics with high shrub and leaf litter with an abundance of native food shrubs Parsons (2008). Other studies strongly suggests that these habitat characteristics are negatively impacted by livestock grazing (Hobbs 2001; Pettit & Froend 2001; Saunder et al. 2003; Spooner & Lunt 2004), and thus livestock presence may result in a reduction in the quality of Malleefowl habitat and thus a decline in Malleefowl presence. Lewis et al 2012 indicated the removal of grazing had positive vegetation outcomes required for maintaining critical Malleefowl habitat.

Installation of boundary fencing at the offset site will therefore benefit Malleefowl by excluding livestock and preventing degradation of habitat quality attributable to pastoral grazing. With the exclusion of livestock, it is also possible that vegetation structure and/or condition in areas previously impacted by livestock could also improve, as previously grazed vegetation recovers.

This approach is consistent with Action 2.3 of the Malleefowl Recovery Plan, which is to 'erect adequate fencing to protect Malleefowl habitat' and reduce grazing pressure.

6.3 Management Action 3 - Predator Management

Feral animals are a known threat to biodiversity primarily through predation of, and competition with native fauna species (Department of Environment and Conservation 2013). Predation by feral animals (fox, cats, and dingos) is a key factor contributing to the decline of Malleefowl species due to mortality (Bode et al. 2011 and Benshemesh J 2007). Feral animals are known to take Malleefowl at all stages of the bird's life cycle, reducing recruitment of Malleefowl into populations (Benshemesh J 2007). Research indicates land managers should prioritise conservation efforts targeted at adult survivorship to have the greatest influence on population viability (Bode et al 2011). Broadscale aerial baiting has been successful in enhancing Malleefowl survival by reducing mortality rates from predation (Wheeler et al 2009). However, research indicates success in improving outcomes for Malleefowl is underpinned by incorporating other feral animal control methods like fencing, trapping and monitoring inclusive of frequent broadscale and localised baiting programs (Bode et al 2011; Priddel et al 1997 and Walsh et al 2012).

Wild dogs and feral cats within the Kalgoorlie area are in high numbers and widespread (GNRBA 2021 and Wynne 2011). Survey work undertaken on EEL55 recorded evidence of wild dog/dingo and cat activity. There is a high likelihood of predation risk to any existing Malleefowl population at the site, resulting in a reduction in stocking rates. Therefore, it is proposed that feral animal monitoring will be undertaken over EEL55 to collect feral animal activity evidence such as scats, tracks, sightings, and fauna deaths. Feral animal activity will be analysed in combination with Malleefowl activity to determine the potential predation risks, and to verify the effectiveness of predator control. The Threatened Species Recovery Hub Project: A guide to surveying red foxes and feral cats in Australia (Hradsky, B. et al., 2021) will be used to guide methodology for development of baselines and monitoring of feral predators. Development of this methodology will be done in consultation with DBCA and other land management groups in the region, such as GNRBA (Goldfields Nullarbor Rangelands Biosecurity Association). Details of methodology implemented and results from baselines will be provided in the Annual Compliance Report.

Recent studies (Nou 2021) noted there is scientific uncertainty regarding the effectiveness of baiting programs on Malleefowl but also that there are many factors affecting efficacy of baiting programs, including the type of bait used, and the intensity and extent of the programs. Northern Star will take these findings into consideration when planning predator control and implementing adaptive management measures should our predator control appear ineffective. The Nou (2021) study also noted the importance of implementing a range of management measures to achieve success. This is supported by Berry et al (n.d.) who identified that conservation fencing is required to completely eradicate introduced predators from mainland reserves and found breeding success was notably improved within fenced reserves.

To achieve the best results practicable, this offset will use an integrated approach to feral animal control that includes a variety of control methods locally and at the broader scale, along with the other management measures that aims to reduce threats to Malleefowl and improve conditions for Malleefowl survival i.e. installation of exclusion fencing, bushfire protection and weed control. A site-specific control program for implementation at EEL55 will be developed based on results and information gained during the predator baseline survey.

Relevant stakeholders (e.g. DBCA, Goldfields Nullarbor Rangelands Biosecurity Association, adjacent landowners, and the Malleefowl Recovery Team) will be consulted to identify opportunities for feral animal control programs to contribute towards regional control programs and optimise benefits of predator control at a landscape scale.

Adaptive management will be triggered if monitoring indicates there is an increase in feral animal activity. Additional adaptive management may include: doggers, trapping, broadscale baiting and a biosecurity fence.

This approach is consistent with objective 4 of the Malleefowl Recovery Plan which aims to reduce predation.

6.4 Management Action 4 - Bushfire Prevention

Malleefowl are found in semi-arid shrublands, and low woodlands dominated by mallee and acacias, and these habitats are highly prone to fire, potentially having lasting effects on Malleefowl populations (Benshemesh J 2007 and Parsons et. al. 2011). The habitat structure and condition at the offset site was considered suitable for Malleefowl and in pristine condition and a fire through the area would have the potential to remove all and/or parts of the

vegetation including influencing the recovery of habitat structure and floristic composition post fire (Benshemesh J 2007). After fire, Malleefowl may not be active in the area for more than ten years, with the loss of suitable habitat structure and floristic composition (leaf litter, vegetation cover, soil gravel and food sources) (Benshemesh J 2007).

Furthermore, the impact of a changing climate suggests that resulting drier conditions and more frequent fires will cause further declines in current Malleefowl populations, and to minimise the impacts from climate change, implementing proactive management practices to protect habitat quality will be required. Climate change projections predict Western Australia can expect longer fire seasons, with around 40% more 'very high' fire danger days, increasing the risk of bushfire at EEL55 and in the wider region. Climate Change impacts of increased temperatures, periods of drought and an increased risk of wildfires adds additional pressure to the conservation of habitat for Malleefowl within the Goldfields region (Matthew et al 2020 and Parsons et al 2011).

Therefore, to minimise the impacts from climate change and subsequent increase in risk of bushfires, proactive management practices will be implemented to protect habitat quality at the offset site. This approach is consistent with Action 3.1 of the Malleefowl Recovery Plan which aims to reduce the occurrence of large fires, where Malleefowl conservation is a priority in large reserves. A firebreak with a maximum width of 5m will be installed along the boundary of EEL55 and will be maintained in accordance with the *Bush Fires Act 1954*. Fire management will be implemented in consultation with neighbouring stakeholders and include installation and maintenance of fire breaks around the site boundary. The integration of all management measures, inclusive with fire management, will preserve the habitat quality, structure and composition to protect the species from the impacts associated with climate change (Stenhouse and Moseby, 2022).

6.5 Management Action 5 - Weed Management

Introduced flora compete with native plants and, therefore, reducing weeds can lead to an increase in habitat condition. Buffel grass (*Cenchrus ciliaris*) in particular, has been identified as posing a threat to Malleefowl, because it may affect Malleefowl through loss of dietary resources, changes to vegetation structure, and increased occurrence and intensity of fire (Grice et al., 2013; Read et al., 2020).

Weed management will aim to improve habitat condition through improving vegetation structure and minimising the establishment of dietary sources for Malleefowl. Weed management would prioritise the detection and control of weeds known to impact Malleefowl such as Buffel Grass. Control of weeds is likely to include physical and/or chemical removal. While weed management has not been identified in the Malleefowl Recovery Plan as a key requirement for Malleefowl conservation, it typically forms part of multidisciplinary land management for conservation of the species and contributes to overall habitat quality.

7.0 Monitoring

This OMP aims to benefit Malleefowl through protecting the offset site via a conservation covenant and improving Malleefowl habitat quality at the offset site. To demonstrate that completion criteria (Table 13) are achieved, habitat quality will need to be monitored.

In accordance with Condition 2d and 2e, once legally secured, Northern Star will monitor and report annually on the presence of Malleefowl at EEL55 and provide evidence to the Department demonstrating the presence of Malleefowl at EEL55 within 5 years of this approval.

Habitat quality assessments will be conducted biennially for the first six years and then triennially thereafter. As outlined in Section 3.5.4, habitat quality is determined through consideration of numerous parameters that include vegetation condition, habitat structure, feral predator activity and Malleefowl activity.

Several monitoring programs will be implemented to collect information on habitat quality parameters. The objectives, methods and frequency of these monitoring programs are outlined in the OMP Implementation Schedule, Completion Criteria and Monitoring (Table 13). Changes to monitoring regimes will be submitted through a revised OMP to the Department for approval.

Exclusion fencing and firebreaks will also be inspected biannually to check the integrity of infrastructure and identify if maintenance is required.

Northern Star (Carosue Dam) Pty Ltd will be responsible for overseeing management and monitoring required as part of this OMP. Monitoring will be conducted by suitably qualified personnel and commence within one year post approval of this OMP. Over time, monitoring will be adapted to account for any trends observed, including accounting for any seasonal or climatic variability, and will be used to determine effectiveness of management measures.

Monitoring has already commenced at EEL 55 and has demonstrated presence of Malleefowl in accordance with Condition 2e and 6 of the approval. As such, an alternative offset site is not required to comply with these Conditions. The associated evidence will be provided in the Annual Compliance Report.

8.0 Audit, Review, Adaptive Management, Reporting and Data Management

8.1 Environmental Auditing

Annual audits will be conducted to assess compliance with this plan. The audits will be undertaken by suitably qualified Northern Star personnel, or external consultants. Audit results will be included in the annual compliance reports for EPBC 2021/9026. An example compliance audit record is provided in Appendix A.

In accordance with Condition 28-31 Northern Star will ensure that an independent audit of compliance with the conditions is conducted for every three-year period following commencement of the Action.

8.2 Offset Management Plan Review

At a minimum, this Offset Management Plan will be reviewed every three years by a suitably qualified environmental expert, for a period of the life of the approval.

This plan will also be reviewed if:

- the results of the audits outlined in section 8.1 show that the completion criteria are not being met or are not tracking towards being met.
- research findings indicate there may be new or better ways to improve outcomes for Malleefowl or their habitat that could be implemented at the site.
- EPBC Act policies or guidance material related to Malleefowl is updated, or if there are otherwise changing circumstances.
- emergency contact details outlined in section 11.0 change.

Where a review of the OMP indicates significant changes are required, the updated OMP will be submitted to DCCEE for review and approval in accordance with Condition 7 and 8.

8.3 Adaptive Management

Adaptive management is important to ensure performance targets and completion criteria are met. It allows for changes in management to be made should audit and review identify performance criteria are not being met or are not on track to being met. Table 12 identifies triggers and corrective actions should this be the case.

Adaptive management measures that stem from new research may also be implemented, where opportunities are identified to improve performance of offset management. These adaptive management measures will be implemented in consultation with DCCEE. This may require the OMP to be updated and re-submitted to DCCEE for assessment and approval in accordance with Condition 7 and 8.

As adaptive management measures are implemented, subsequent audits are expected to identify whether actions are effective or whether further actions are required. Management of the offset site will therefore be a continuous process of monitoring, review and action.

Adaptive management measures implemented will be outlined in the annual compliance report. This may include, for example, where trapping, in addition to baiting, is implemented or if monitoring frequency is increased.

Northern Star will provide an alternative and/or additional offset if the completion criteria are not met after implementing adaptive management measures and in accordance with Condition 6.

8.4 Reporting

In accordance with Condition 2c, Northern Star will provide written evidence to the Department, including shapefiles and offset attributes, demonstrating that the EEL55 offset site has been legally secured, within 10 business days of securing offset site. Once the EEL55 offset site has been legally secured, Northern Star will report annually on the presence of Malleefowl at the EEL55 offset site for the life of the approval and provide evidence demonstrating the presence of Malleefowl at EEL55 within 5 years of this approval in accordance with Condition 2d-e.

8.4.1 Annual Compliance Reporting

The annual compliance report for EPBC 2021/9026 in accordance with Conditions 21-24, will include a compliance audit that assesses performance against the OMP. The OMP compliance audit will outline:

- Management actions implemented within the reporting period, including any adaptive management measures implemented.
- Monitoring conducted during the reporting period (e.g. annual weed, predator and Malleefowl monitoring, biennial/triennial vegetation monitoring and habitat quality assessments) and any changes to monitoring frequency.
- Management triggers actioned during the reporting period and corrective actions implemented or planned.
- Review of progress towards completion criteria in accordance with the implementation schedule, and identification of potential non-compliances.

8.4.2 Reporting Non-Compliance

Northern Star will notify the Department of any incident and/or potential or actual non-compliance with conditions or commitments made in this OMP, in accordance with Conditions 25-27.

8.5 Data Management

Northern Star commits to the submission and publication of all plans required by these conditions in accordance with Conditions 9-13.

Data will be stored and protected by Northern Star for the duration of the approval. This will include maintaining data records to confirm all activities associated with the management actions in this OMP have been undertaken as outlined in the OMP.

Monitoring data may be provided to other stakeholders such as the National Malleefowl Recovery Team, DBCA, Traditional Owners and other Conservation Groups, to facilitate a broader understanding of Malleefowl. Acknowledging that environmental management at a landscape scale can enable a deeper understanding the species, allow for identification of regional population trends, and provides for more effective management over time, leading to better conservation outcomes for the species.

Submission of this OMP to DCCEEW will be accompanied by a digital version of the offset attributes and shapefiles of Malleefowl habitat at EEL55, in accordance with the DAWE (2021) Guide for providing maps and boundary data for EPBC Act projects.

If the specifics of the offset change, updated shapefiles will be published with annual compliance reports for EPBC 2021/9026.

9.0 Environmental Roles and Responsibilities

Table 14 identifies the roles and responsibilities relating to the implementation of this OMP.

Table 14: Environmental roles and responsibilities

Role	Responsibility
Site General Manager	<ol style="list-style-type: none"> 1. Ensure adequate provisioning to meet the requirements of the plan. 2. Facilitate implementation of the plan, including associated monitoring, review and reporting.
Site Environmental Advisors	<ol style="list-style-type: none"> 3. Maintain site records of surveys and any other relevant environmental data. 4. Coordinate management activities such as fencing, firebreak maintenance and predator control. 5. Implement monitoring programs that allow for review of effectiveness of the plan and progress toward completion criteria. 6. Complete compliance reporting.

10.0 Environmental Training

Environmental training will be provided to all relevant staff including temporary contractors prior to the commencement of land management within EEL55 to ensure they understand the requirements of the plan. Training will be aimed at minimising impacts on the species whilst land management is being undertaken, ensuring site environmental controls, and key roles and responsibilities of all personal are adhered to.

Training will cover topics such as:

- The requirement to prevent vegetation disturbance.
- Identifying Malleefowl and keeping a distance from them.
- Identifying Malleefowl mounds to avoid disturbance of mounds.
- The importance of good housekeeping at the offset site.
- Other topics as deemed relevant by the Site Environmental Advisors

Records of staff and contractors completing training will be maintained as per site training protocols.

11.0 Emergency Contacts and Procedures

During land management activities, the Carosue Dam Operations Environment Department must be notified in emergency events including, but not limited to:

- Bushfire at the site or nearby where authorities have indicated that EEL55 is at risk.
- Where there is, or likely to be, a direct impact to the Malleefowl/fauna or mound during land management activities.

The Carosue Dam Environment Department can be contacted on:

Phone: (08) 6229 9519

Email: cdoenviro@nsrltd.com

12.0 Glossary

Term	Definition
DBCA	Department of Biodiversity, Conservation and Attractions
Department and/or DCCEEW	Department of Climate Change, Energy, the Environment and Water
DFES	Department of Fire Emergency Services
DPIRD	Department of Primary Industries and Regional Development
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
EEL55	Exempt East Location 55
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
Malleefowl	Malleefowl (<i>Leipoa ocellata</i>)
MNES	Matters of National Environmental Significance
Northern Star	Northern Star (Carosue Dam) Pty Ltd
Offset Proposal	Refers to document Carosue Dam TSF Cell 4 Project Offset Proposal EPBC Act Referral 2021/9096 15 July 2022.
OMP	Offset Management Plan
TSF	Tailings Storage Facility
The Project	The construction of TSF Cell 4 and associated infrastructure

13.0 References

Alexander Holm & Associates (2022a). Assessment of Impacts on Malleefowl of Proposed expansion of Carosue Dam tailings storage facility. Report prepared for Norther Star Resources Ltd April 2022.

Alexander Holm & Associates (2022b). Assessment of Malleefowl Activity on Location EEL55. Report prepared for Norther Star Resources Ltd May 2022.

Alexander Holm & Associates (2012). Environmental assessment: Tailings storage facility expansion. Report prepared for Saracen Gold Mines Pty Ltd

Alexander Holm & Associates (2019). Environmental assessment: Proposed Seismic Survey. Report prepared for Saracen Gold Mines Pty Ltd

Benshemesh, J. (2007). National Recovery Plan for Malleefowl. Department for Environment and Heritage, South Australia. National Recovery Plan for Malleefowl (*Leipoa ocellata*) (nationalMalleefowl.com.au)

Berry, L. E., L'Hotellier, F., Ruykys, L., and Kavanagh, R. P. (no date). The Role of Private Land Management in Malleefowl Conservation; fenced reserves, land management, monitoring and research. Australian Wildlife Conservancy . Perth Western Australia. Available at https://www.nationalmalleefowl.com.au/uploads/file/NMF2018_final%20paper_Lawrence%20Berry%20et%20al.pdf. Accessed 25 January 2023.

Bode, M., & Brennan, K. (2011). Using population viability analysis to guide research and conservation actions for Australia's threatened Malleefowl *Leipoa ocellata*. *Oryx*, 45(4), 513-521. doi:10.1017/S0030605311000688.

Commonwealth of Australia. (2014). Environmental Management Plan Guidelines. Environmental Management Plan Guidelines. The Department of Agriculture Water and Environment.

Commonwealth of Australia. (2022). Draft National Recovery Plan for the Malleefowl (*Leipoa ocellata*). Prepared by The National Malleefowl Recovery Team and the Department of Climate Changes, Energy, the Environment and Water.

Department of Environment and Conservation (2013). Great Western Woodlands Draft Strategic Weed and Feral Animal Management Plan, Department of Environment and Conservation, Perth.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPC). (2012). Environment Protection and Biodiversity Conservation Act 1999, Environmental Offsets Assessment Guide, October 2012.

Eldridge, D., Poore, A., Ruiz-Colmenero, M., Letnic, M., and Soliveres, S. (2015). Ecosystem structure, function, and composition in rangelands are negatively affected by livestock grazing. *Ecological Applications*. 26(4): 1273-1283.

Frith HJ (1959). Breeding of the Mallee Fowl, *Leipoa ocellata* Gould (Megapodiidae). *CSIRO Wildlife Research* 4, 31–60.

Goldfields Nullarbor Rangelands Biosecurity Association (GNRBA). (2021). Wild Dog Management Plan 2020-2024, updated May 2021.

Grice AC, Vanderduys EP, Perry JJ & Cook GD (2013). Patterns and processes of invasive grass impacts on wildlife in Australia. *Wildlife Society Bulletin* 37, 478–485.

Hobbs, R. J. (2001). Synergisms among Habitat Fragmentation, Livestock Grazing, and Biotic Invasions in Southwestern Australia. *Conservation Biology* 15: 1522-1528.

Hradsky, B., McGregor, H., Rees, M., Le Pla, M., Keem, J., Wintle, B., Legge, S., (2021). A guide to surveying red foxes and feral cats in Australia. NESP Threatened Species Recovery Hub Project 1.1.5 report, Brisbane.

Lewis, M., Arnott, A., and Higgins, A (2012). The Devil is in the Detail - Managing feral goat grazing at breeding sites for the endangered Malleefowl *Leipoa ocellata*. In: Proceedings of the 17th Australian Rangeland Society Biennial Conference.

Lunt, I. D., Eldridge, D. J., Morgan, J. W. & Witt, G. B. (2007). A framework to predict the effects of livestock grazing and grazing exclusion on conservation values in natural ecosystems in Australia. *Australian Journal of Botany* 55: 401-415 <https://doi.org/10.1071/BT06178>.

National Malleefowl Recovery Team (2020). National Malleefowl Monitoring Manual: Edition: v2020_1 - (Revised June 2020).

Nou, T., Maron, M., Evans, M., Walsh, J., Benshemesh, J., Southwell, D., Kington, L., Bamford, M., Bastow, B., Jackson, J., McWhinney, K., Bannerman, M., Copley, P., Parsons, B. (2021). Lessons from using expert elicitation where scientific uncertainty is high: the case of the Malleefowl. NESP Threatened Species Recovery Project 5.1. Research findings factsheet, Threatened Species Recovery Hub, Brisbane

Parsons, B. (2008). Malleefowl in the fragmented Western Australian Wheatbelt: spatial and temporal analysis of a threatened species. Ph.D. thesis. School of Animal Biology, University of Western Australia, Crawley, WA. Hopkins University Press. 7th edition, Volume 2

Parsons, B., & Gosper, Cl. (2011). Contemporary fire regimes in a fragmented and an unfragmented landscape: implications for persistence of the fire-sensitive Malleefowl.

Pettit, N. E. & Froend, R. H. (2001). Long-term changes in the vegetation after the cessation of livestock grazing in *Eucalyptus marginata* (Jarrah) woodland remnants. *Austral Ecology* 26: 22–31

Phoenix Environmental Services. (2022). Malleefowl Offset Survey. Report prepared for Northern Star Resources Ltd. May 2022.

Priddel, D. & Wheeler, R. (1997). Efficacy of Fox Control in Reducing the Mortality of Released Captive-reared Malleefowl, *Leipoa ocellata*. *Wildlife Research* 24, 469-482.

Read JL, Firn J, Grice AC, Murphy R, Ryan-Colton E & Schlesinger CA (2020). Ranking buffel: Comparative risk and mitigation costs of key environmental and socio-cultural threats in central Australia. *Ecology and Evolution* 10, 12745–12763.

Saunders, D. A., Smith, G. T., Ingram, J. A. & Forrester, R. I. (2003). Changes in a remnant of salmon gum *Eucalyptus salmonophloia* and York gum *E. loxophleba* woodland, 1978 to 1997. Implications for woodland conservation in the wheat-sheep regions of Australia. *Biological Conservation* 110: 245-256.

Spooner, P. & Lunt, I. (2004). The influence of land-use history on roadside conservation values in an Australian agricultural landscape. *Australian Journal of Botany* 52: 10.1071/BT04008.

Stenhouse, P. and Moseby, K (2022) Trends in breeding activity of the threatened Malleefowl (*Leipoa ocellata*): what can we expect under a changing climate? *Emu - Austral Ornithology*. 122 (1): pg 51-60

Walsh, J. C., Wilson, K. A., Benshemesh, J., and Possingham, H. P. (2012). Integrating research, monitoring and management framework to achieve effective conservation outcomes. *Animal Conservation*, 15: 334-336.

Wheeler, R. (2018). The Threats to Malleefowl, *Leipoa ocellata*: An Appraisal of the "Usual Suspects", i.e., Predation by Foxes, Competition with Introduced Herbivores and Changed Fire Frequency. Office of Environment and Heritage, NSW.

Wynne, E. (2011). Feral Cats caught on camera in Goldfields bush. ABC Local. 14 June 2011.

Appendix A – Offset Compliance Assessment Example

Completion Criteria	Actions	Schedule & Timeframes	Evidence/Comments (Examples)	Date	Compliance (Y/N)	Management Actions Implemented	Monitoring Completed	Management Triggers Actioned	Corrective Actions Implemented
Conservation covenant granted.	<ul style="list-style-type: none"> Conservation covenant applied for and granted 	<ul style="list-style-type: none"> Application made within 6 months of approval of EPBC 2021/9026 (Condition 2a) Conservation covenant granted within 6 months of approval of the OMP (Condition 2b) 	<ul style="list-style-type: none"> Application for Conservation Covenant submitted to the Soil Commissioner on [date]. Conservation Covenant accepted on [date] and registered on the Certificate of Title. Documentation received and retained on [file location]. 						
Fencing installed and capable of excluding livestock	<ul style="list-style-type: none"> Exclusion fencing installed and maintained 	<ul style="list-style-type: none"> Fencing installed within 1 year of approval of OMP Fencing maintained for life of the approval 	<ul style="list-style-type: none"> Fence inspection conducted on [date] by [personnel]. Inspection record and photos retained on [file location] 						
Decrease in predator activity	<ul style="list-style-type: none"> Predator control program Annual predator activity surveys 	<ul style="list-style-type: none"> Review of effectiveness of program conducted annually 	<ul style="list-style-type: none"> Records of predator control included [type] implemented at [location] Annual predator activity survey reports including records of predator activity (sightings, scats, tracks and other evidence) Records of predator activity registered within a spatial database and retained on [file location] 						
Firebreaks established and maintained	<ul style="list-style-type: none"> Firebreak is installed around offset site 	<ul style="list-style-type: none"> Firebreak installation within 1 year of approval of the OMP 	<ul style="list-style-type: none"> Firebreak installed on [date] by [company] Invoice retained on [file location] 						
	<ul style="list-style-type: none"> Firebreak maintained in accordance with industry standards 	<ul style="list-style-type: none"> Biannual maintenance inspections for life of the approval 	<ul style="list-style-type: none"> Firebreak inspection conducted on [date] by [personnel]. Inspection record and photos retained on [file location] 						
No degradation to habitat quality due to increased weed cover	<ul style="list-style-type: none"> Weed control program Annual weed monitoring 	<ul style="list-style-type: none"> Annual inspection for life of the approval 	<ul style="list-style-type: none"> Visual inspection for weeds conducted during monitoring and/or maintenance inspections on [date] by [personnel] Inspection record and photos retained on [file location] 						



Completion Criteria	Actions	Schedule & Timeframes	Evidence/Comments (Examples)	Date	Compliance (Y/N)	Management Actions Implemented	Monitoring Completed	Management Triggers Actioned	Corrective Actions Implemented
Malleefowl habitat quality score 8.7	<ul style="list-style-type: none"> Habitat quality assessments informed by: <ul style="list-style-type: none"> - Vegetation and habitat monitoring - Malleefowl monitoring - Predator Activity monitoring 	<ul style="list-style-type: none"> Habitat quality assessment and vegetation monitoring biennially for the first six years then triennially thereafter Predator and weed monitoring annually 	<ul style="list-style-type: none"> Habitat quality assessment reports LiDAR analysis reports Malleefowl mound monitoring inspection records and photos retained on (file location) Vegetation and habitat inspection records and photos retained on (file location) Weed inspections records and photos retained on (file location) Predator activity inspections records and photos retained on (file location) 						