Eyre Peninsula Transmission Line Malleefowl Offset Strategy

Prepared by Ecological Horizons on behalf of Electranet, September 2021

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Declaration of Accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Environment Offset Strategy (Eyre Peninsula Transmission Line Offset Strategy) is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the approval holder.
3. I am aware that:
    a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
    b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.
    c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signature:

Position: Land Services Manager, ElectraNet

Date: 1 February 2022

Document control/history

Revision	Revision Date	Document Status	Author	Approved by
1	September 2021	Issued for review	Ecological Horizons	Electranet
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1. Glossary of Terms

Term	Definition
DAWE	Department of Agriculture, Water and the Environment
DC	District Council
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
Management Area	4,000 ha area within the Secret Rocks Nature Reserve where management actions will be applied to drive Malleefowl habitat improvement within the Offset Area
NMRT	National Malleefowl Recovery Team
Offset Area	100 ha area within the Secret Rocks Nature Reserve where Malleefowl habitat will be improved
Offset Strategy	Eyre Peninsula Transmission Line Offset Strategy
PMR	Protected Matters Report
Project Area	The development envelope where construction and operation of the powerline will be undertaken

2. Executive Summary

Electranet is constructing, and plans to operate, a transmission line on the Eyre Peninsula, in South Australia, from Cultana to Port Lincoln. The 262 km transmission line consists of installation of poles, stringing of lines, construction of access tracks, construction of substations, construction of camps/compounds and laydown areas and installation of temporary transmission lines.

An assessment of the proposal identified potential impacts to Malleefowl *(Leipoa ocellata*) habitat and established a requirement for an offset for clearance of 20.5 ha of Malleefowl breeding and foraging habitat. Malleefowl are currently listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC).

The objective of the Offset Strategy is to support improvement of Malleefowl habitat, in an area of continuous native vegetation adjacent to the Project Area (powerline route) where Malleefowl are known to exist. This involves an improvement in habitat quality in a 100 ha Offset Area through implementation of management actions in a 4,000 ha Management Area within the Secret Rocks Nature Reserve on the Eyre Peninsula in South Australia.

3. Introduction and Background

Electranet received approval (EPBC 2019/8583) on the 11th of March 2021 to construct and operate a transmission line on the Eyre Peninsula from Cultana to Port Lincoln, South Australia (Figure 1). The new transmission line will replace the existing single-circuit 132 kilovolt (kV) transmission line which has been in service since 1967 and contains several sections which now require major replacement works. The Project Area, where disturbance will be undertaken, is located on the eastern side of the Eyre Peninsula, extending over approximately 290 km from the existing Cultana electricity substation just north-west of Whyalla, to Port Lincoln.

Disturbance activities are required to install and access poles and towers, to string the transmission line, to construct substations, for provision of construction camps/compounds, construction of equipment laydown yards and construction of temporary transmission lines.

Malleefowl (*Leipoa ocellata*) are currently listed as Vulnerable under the EPBC Act (1999) (Plate 1). The Malleefowl is a ground dwelling bird which is found in semi-arid to arid areas in Southern Australia (DAWE 2021). The population has declined significantly since European settlement because of land clearing for agriculture, altered fire regimes, increased pressure from introduced predators, competition from introduced herbivore and declining rainfall trends (DAWE 2021).

Malleefowl nesting activity on the Eyre Peninsula has been declining over the last few decades with long term monitoring by DEW and Ecological Horizons recording a decline in activity at five of the six grids monitored. Radiotags were placed on eight adult Malleefowl on the Eyre Peninsula by PhD student Peri Stenhouse and most Malleefowl were killed by foxes, cats or extreme weather events. Roadkill from vehicles also has a significant impact. Climate change is expected to exacerbate the decline in Malleefowl by increasing drought and heat wave frequency. Grazing pressure from overabundant kangaroos and goats and domestic stock reduces ground cover and food availability leading to increased exposure to predators and lower productivity for nesting birds. Habitat fragmentation can also affect population connectivity and cause genetic inbreeding. These threats can be addressed through a combination of predator and herbivore control, prevention of further land clearance and improving vegetation cover.

Plate 1: Adult Malleefowl shown in typical habitat on Eyre Peninsula

The northern extent of the Project Area consists of good quality vegetation (high native species and structural diversity and low to nil weed cover) and overlaps with the known habitat range of Malleefowl. Malleefowl have been recorded within the Project Area with several active mounds recorded throughout mallee associations in the northern extent of the Project Area in 2013/14. Additional mounds and activity have been recorded within 2 km of the Project Area since 2012. The area of mallee habitat is large and mostly intact (ie not fragmented). More recently, a fresh Malleefowl track was observed by EBS Ecology in September 2019 (EBS Ecology, 2019), a radiotagged Malleefowl frequently traversed the Project Area in 2020 (Stenhouse and Moseby unpublished data) and a recorded sighting of a Malleefowl in the Project Area was recorded by Downer personnel in August 2021 (pers. comm. K Moseby).

Given this, there is a potential for impacts on Malleefowl individuals or populations, including; clearance of suitable habitat during construction works, reduced reproduction rates (eg abandoned nests) during construction works; increased predation due to the creation of "predator highways" within new access tracks allowing predators such as foxes and feral cats to move through the area with ease; increased kangaroo browsing pressure from slashing of vegetation under the powerline, and increased predation due to the creation of additional roosting sites for birds of prey (ie poles/towers).

Approval EPBC 2019/8583 requires an appropriate offset be established which benefits Malleefowl, given the disturbance undertaken by the project. The powerline passes through the Secret Rocks Nature Reserve and an offset is proposed to be established within this reserve. The Secret Rocks Nature Reserve covers 25,000 ha and connects to other large expanses of undisturbed Mallee. Malleefowl are known to inhabit and nest within the Reserve and the broader region. Therefore, the Proposed Offset Area and Management Area are located within the Secret Rocks Nature Reserve. The

Project Area dissects the Secret Rocks Nature Reserve and is in the same habitat and considered to be appropriate.

A land-based offset (preventing clearing of further native vegetation) option is not considered to be optimal given the expanse of remnant intact vegetation (approximately 40%) still present on the Eyre Peninsula, the majority of which is already formally protected. It is proposed that a 4,000 ha area (Management Area) of the Secret Rocks Nature Reserve is actively managed to improve the habitat quality of a 100 ha Offset Area located within the Management Area. Management activities proposed are consistent with priorities included in the National Recovery Plan for Malleefowl. Management activities include controlling herbivores (goats and kangaroos), controlling cats and foxes and installing a barrier fence between the Management Area and adjacent cropping land to reduce kangaroo and goat reinvasion. Within the Offset Area, a LiDAR survey and assessment will be undertaken to identify Malleefowl nest mounds and predict optimal habitat and monitoring of nest mound activity will be completed.

The intent of this Offset Strategy is to improve the habitat quality for individuals and populations of Malleefowl within a section of the Secret Rocks Nature Reserve on the Eyre Peninsula.

Condition 13 of EPBC approval EPBC 2019/8583 details the requirements regarding the submission of an Offset Strategy relating to disturbance of Malleefowl habitat. This document meets the requirements of the provision of an Offset Strategy.

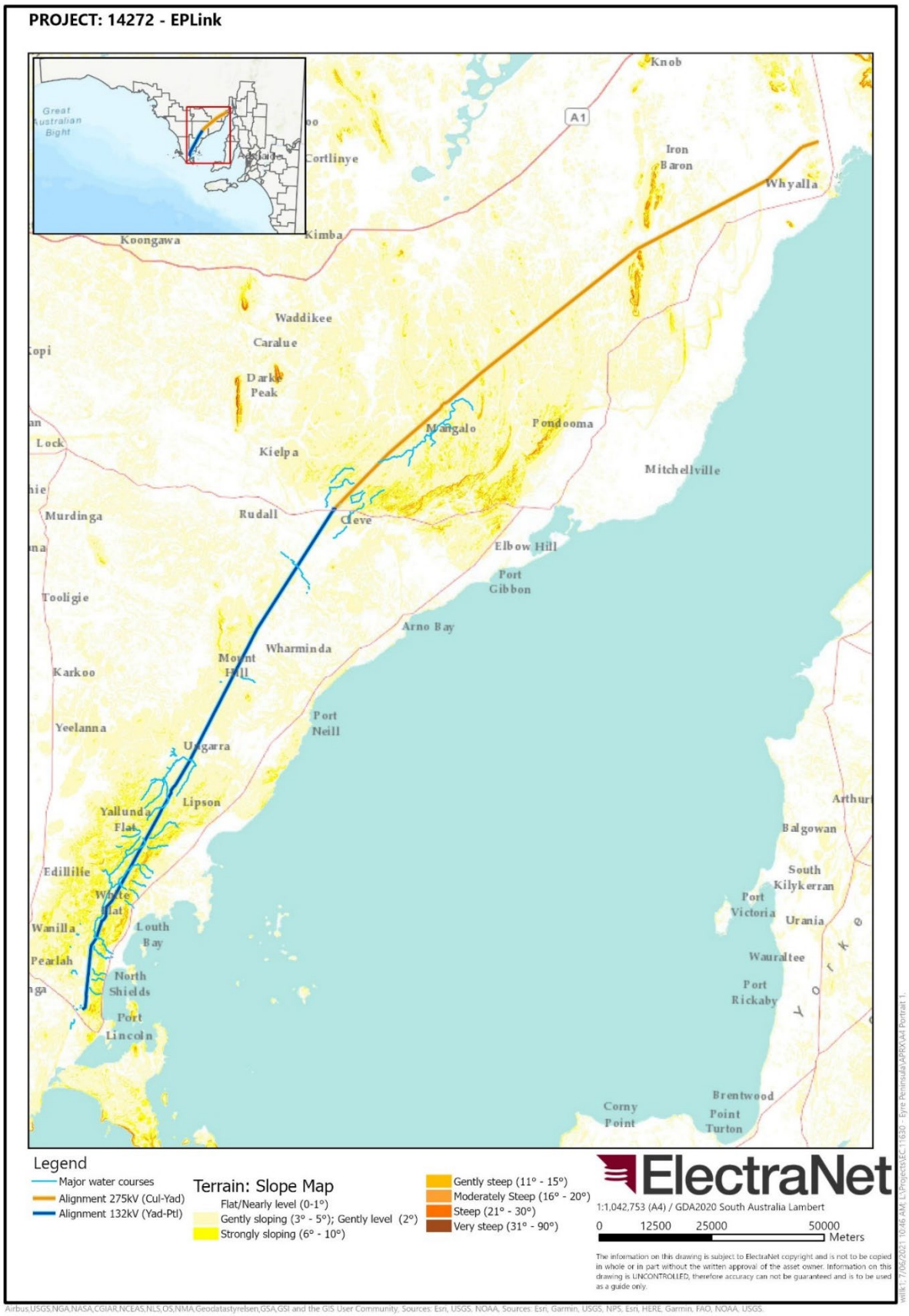

Figure 1: Eyre Peninsula transmission line route (Project Area)

4. Compliance Table and Policy Objectives

Table 1 details the offset approval conditions specific to approval EPBC 2019/8583. The table includes how the approval condition has been met and where in the document it has been addressed. Note this Offset Strategy only includes approval conditions relating to the Malleefowl. A separate Offset Strategy specific to Eyre Peninsula Blue Gum TEC will be provided.

Table 1: Approval conditions, including how and where they have been addressed

Approval condition	How and where addressed
13. To compensate for the residual significant impacts to the Malleefowl and Eyre Peninsula Blue Gum TEC, including the clearing of up to 77.44 ha of the Malleefowl habitat and 1.352 ha of Eyre Peninsula Blue Gum TEC, the approval holder, within six (6) months of the date of this approval, submit an Offset Strategy for the Minister's approval. The Offset Strategy must.	
i. specify the final area of Malleefowl habitat and Eyre Peninsula Blue Gum TEC that will be cleared by the action;	The total disturbance area 20.5 ha and is also discussed Section 6.1.
ii. propose detailed offsets that will realise a conservation benefit for the Malleefowl and Eyre Peninsula Blue Gum TEC in accordance with the relevant approved conservation advice, recovery plan, threat abatement plans and regional conservation plans;	Offset details and context are described in Section 7. Relevant plans and advices are listed in Table 4. Offset activities are proposed to be undertaken for the life of the approval which is 40 years. This also supports the long timeframes required to reverse declines in habitat quality and the relatively long lifespan of Malleefowl, which may delay initial responses to management. Table 4 includes detail on how the Offset Strategy addresses relevant objectives, criteria and actions.
iii. include a description of the potential risks to the successful implementation of any proposed offset (including, but not limited to, environmental, administrative, financial and governance risks);	Potential risks are detailed in Table 12 in Section 9.
iv. include a description of the measures that will be implemented to mitigate the risks associated with any proposed offset and a description of the contingency measures that will be implemented if triggers are detected or completion criteria are not met;	Control and contingency measures are detailed Table 12 in Section 9.
v. include processes to adaptively manage proposed offsets;	Adaptive management processes are detailed in Section 10.

Approval condition	How and where addressed
vi. explain how the proposed offsets meet the requirements/principles of the EPBC Act Environmental Offsets Policy; and	Requirements of the EPBC Act Environmental Offsets Policy and how the proposed offsets meet these is covered off in Table 2 in Section 5.
vii. ensure the measures that will be implemented as part of the Offsets Strategy have no detrimental impact on the EPBC Act listed flora or fauna species.	This is discussed in Section 11.
14. The approval holder must implement the approved Offset Strategy. The approval holder must commence implementation of the offsets specified in the approved Offset Strategy within three months of the approval of the Offset Strategy, or another time as agreed in writing by the Minister. The approval holder must not energise the transmission line unless the Offsets Strategy has been approved by the Minister in writing.	This commitment is included in Section 5.

Offset requirements, as detailed in Section 7 of the EPBC Act 1999 Environmental Offsets Policy (Commonwealth of Australia, 2012), are listed in Table 2. This table also includes information regarding how and where each of the requirements have been addressed in this document.

Table 2: EPBC Offset Policy requirements and how they have been addressed

EPBC Act Environmental Offset Policy Principle/Requirement	How and Where Addressed
7.1 Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter	The active management of herbivores and feral animals within the 4000 ha Management Area (which includes the 100 ha offset area) will assist in improving habitat quality for Malleefowl and achieving a conservation outcome. Malleefowl and their nesting mounds have been recorded within the Management Area and Offset Area, and within the wider region surrounding both areas. However, Malleefowl activity has declined over the last two decades across the Eyre Peninsula. Confirmation of the improvement in habitat quality will be made through the monitoring, review and reporting processes detailed in Section 12.
7.2 Suitable offsets must be built around direct offsets but may include other compensatory measures	A land-based offset (preventing clearing of further native vegetation) option is not considered to be optimal given the expanse of land already set aside for conservation on the Eyre Peninsula, the majority of which is already formally protected. It is proposed that a 4,000 ha Management Area of the Secret Rocks Nature Reserve is actively managed to reduce threats to Malleefowl and improve the habitat quality of a 100 ha Offset Area located within the Management Area. This is further discussed in Section 7.1.

EPBC Act Environmental Offset Policy Principle/Requirement	How and Where Addressed
7.3 Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	Malleefowl are classified as Vulnerable under EPBC and this was considered when determining the Offset Area. The offset is considered to be appropriate and proportionate to the disturbance activity. The size of the Offset Area (100 ha) has been discussed with DAWE and assessed using the Offset Assessment Guide.
7.4 Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter	Malleefowl are classified as Vulnerable under EPBC and this was considered when determining the Offset Area. The offset (100 ha) is considered to be appropriate and proportionate to the disturbance activity (20.5 ha). The size of the Offset Area has been discussed with DAWE and assessed using the Offset Assessment Guide.
7.5 Suitable offsets must effectively account for and manage the risks of the offset not succeeding	The risk that the proposed offset will not deliver the improvement in habitat quality through the activities proposed is considered low. Risks have been assessed and are included in Section 9. Controls such as flexibility with timing of herbivore and cat/fox control and fence maintenance, will provide a high level of certainty of success of the offset.
7.6 Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs	The proposed offsets are additional to that required by any other approval condition. Condition 9 of the EPBC approval EPBC 2019/8583 requires that fox baiting be undertaken biannually, and cat baiting be conducted annually in all areas of Malleefowl habitat along the development envelope. Note that baiting related to this condition would be undertaken along the transmission line corridor. The predator control efforts referred to in this Offset Strategy are in addition to those specified in the approval and will be undertaken in the Management Area (which includes the Offset Area).
7.7 Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offset is: • Efficient – the combined use of herbivore and cat/fox control, in conjunction with the barrier fence is considered an efficient way of reducing pressure on Malleefowl. • Effective – methods used have been shown to be effective within other conservation projects (Kinnear *et al*. 1998; Russell *et al.* 2011; Read *et al*. 2015; Brandle *et al*. 2018). • Timely – the activities proposed will commence in year 1 of the approval and continue throughout the approval period. • Transparent – the Offset Strategy will be made available to the public on a website as per Condition 19. • Scientifically robust – the proposed offset is backed by a significant amount of scientific research and experimentation; and addresses priorities and methods detailed in relevant plans for foxes (DEWHA 2008, and Moseby and Hill 2011), malleefowl (NMRT 2020 and Read *et. al*. 2014), goats (Moseby et. al. 2021) and feral cats (DE 2015, and Moseby and Hill 2011). Fences enhance herbivore management (Russell *et al*. 2011) and cat/fox control is more effective along fences (Read *et al*. 2015). • Reasonable – the proposed activities are considered reasonable in achieving the stated outcome and are located close to the area of impact within the same habitat type.

EPBC Act Environmental Offset Policy Principle/Requirement	How and Where Addressed
7.8 Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced	The proposed offset will be managed by Ecological Horizons. Auditing and reporting will be undertaken as per the Table of Accountabilities in Section 12 and made available to DAWE.

5. Statement of Objectives

The objective of the Offset Strategy, along with targets, completion criteria, performance targets and associated evidence are shown in Table 3. Once approved, this Offset Strategy will be implemented within three months. The transmission line will not be energised unless the Offset Strategy has been approved.

Table 3: Objective, targets, completion criteria, performance targets and evidence

Objectives	Targets	Completion Criteria	Performance Targets	Demonstrated Evidence
Reduction in threats and increase in habitat quality for Malleefowl	A long-term trend (over a 15 year time period) of decreased detections of goats and kangaroos over the approval period	Control of goats and kangaroos – reduction of 50% across management area, relative to reference areas in the region where no feral animal control is undertaken	Completion of annual control of goats and kangaroos – reduction relative to reference areas of 10% across management area at 5 years; reduction from reference areas of 25% at 10 years; reduction from reference areas of 50% at 15 years Maintenance of barrier fence and spear gate – any gaps in fencing fixed with 1 month of being detected; any problem with spear gate is fixed within 1 month of being detected	Abundance of herbivores fluctuates widely according to seasonal conditions. However, we aim for a 50% reduction in abundance of goats and kangaroos relative to unmanaged populations. Abundance is assumed to be related to camera trap detections. A decline in monthly camera trap detection rates (number of detections divided by total no. of camera trap nights) of goats and kangaroos at permanent camera sites placed across the management area compared to permanent cameras within the reference area is indicative of a decline in numbers of both species. A reduction in numbers of goats and kangaroos will reduce grazing pressure and result in an increase in food availability and habitat quality for Malleefowl. An increase in habitat quality for Malleefowl will result in a long-term increase in nest mound activity over the approval period.

Objectives	Targets	Completion Criteria	Performance Targets	Demonstrated Evidence
	A long-term trend of decreased detections of cats and foxes over the approval period	Control of cats and foxes – reduction from reference area where no control of foxes and cats is undertaken of 50% across management area	Completion of fox/cat control every four months – reduction from reference area of 15% across management area at 5 years; reduction from reference area of 30% at 10 years; reduction from references area of 50% at 15 years	Cat and fox camera detections fluctuate in relation to seasonal conditions and prey availability. A decline in monthly cameras detection rates of cats and foxes at permanent camera sites in the management area compared to the reference area is indicative of a decline in numbers of both species. A reduction in numbers of cats and foxes will reduce predator pressure and result in an increased number of Malleefowl. A decrease in predation rates for Malleefowl will result in a long-term increase in nest mound activity over the approval period.

6. Project Details

ElectraNet have received approval to construct and operate an electricity transmission line from the existing Cultana electricity substation near Whyalla, to Port Lincoln, on the Eyre Peninsula, South Australia. The new transmission line will replace the existing single-circuit 132 kilovolt (kV) transmission line which has been in service since 1967 and contains several sections which now require major replacement works.

The new transmission line will involve a new double-circuit line from Cultana to Yadnarie that is initially energised at 132 kV (which has the option to be energised at 275 kV if required in the future), and a new 132 kV double-circuit line from Yadnarie to Port Lincoln.

The proposed action is located on the eastern side of the Eyre Peninsula and occurs over approximately 290 km from the existing Cultana electricity substation just north-west of Whyalla, to Port Lincoln. Approximately 262 km of transmission line will be constructed on the western side of the existing transmission line. The new transmission line will involve a 100 m wide easement, located immediately west of the existing 40 m wide transmission line easement. Approximately 536 poles/towers (structures) will be installed to support the transmission line along the 262 km alignment.

The new transmission line passes to the west of the townships of Cleve and Tumby Bay and passes through the following Local Government Areas: City of Whyalla, the District Council (DC) of Franklin Harbour, the DC of Cleve, the DC of Tumby Bay and the DC of Lower Eyre Peninsula, as well as a section of the Pastoral Unincorporated Area.

Landforms across the Project Area are dominated by undulating limestone plains overlain by longitudinal dune systems in the more arid northerly sections, with shallow, low hills and ranges and shallow freshwater creeks and drainage lines through the Cleve Hills and Koppio Hills. The region supports some sensitive environmental areas, including large tracts of remnant vegetation, conservation parks and reserves.

6.1. Disturbance activities

The potential impacts of the proposed action on Malleefowl individuals or populations include the following:

- clearance of approximately 20.5 ha of suitable habitat during construction works, of which approximately 6 ha will be permanently impacted, and the remaining 14.5 ha will be rehabilitated after construction
- reduced reproduction rates (eg abandoned nests) during construction works
- increased predation due to the creation of "predator highways" within new access tracks which allow predators such as foxes and feral cats to move through the area with ease, and
- increased predation due to the creation of additional roosting sites for birds of prey (ie poles/towers).

Pole/Tower access

Access to each pole/tower site will be required during construction and operation/maintenance activities. Existing access tracks associated with the existing transmission line will be used where possible and practicable, reducing the need to create new access tracks. Access to new poles/towers will be achieved via a combination of existing access tracks, new spur tracks and sections with a new longitudinal access track.

Transmission Line (electrical cable) Stringing

Construction works will involve stringing (installation) of electrical cables along the 262 km transmission line. Approximately 141 stringing areas (50 m x 50 m) will be required along the 262 km alignment. A 10 m wide stringing access corridor will also be required along the 262 km alignment. In native vegetation or habitat areas, the stringing access corridor will be established using low-impact clearing methods and helicopter stringing will be undertaken reducing overall clearance areas.

The stringing access corridor is only required temporarily during stringing works and will be allowed to regenerate post construction works. Where an existing longitudinal track exists or is required to be constructed (see Pole/Tower access), the stringing access corridor will be limited to 5 m wide.

Substations

Minor upgrades at substations located at Cultana, Middleback, Wudinna, Yadnarie and Port Lincoln will be undertaken. Substation sites will also be used as major laydown sites during construction.

Construction camps/compounds and materials and equipment laydown areas

At least two temporary construction camps/compounds approximately 2 ha in size each, will be utilised during construction works, one in the north and one in the south. They will include site construction offices, parking areas, lunchrooms, toilets and other similar facilities, as well as materials and equipment laydown areas, which will be used during construction. Ten other temporary construction laydown areas will be required at various locations along the transmission line alignment to store construction materials and equipment during construction. Where possible, these will be located in existing cleared areas or cropping areas to avoid/minimise impacts to native vegetation and habitat.

Temporary transmission lines

A temporary transmission line will be installed at Boston during construction to maintain electricity supply to the Eyre Peninsula while the new transmission line is being established. The temporary transmission line will be removed once it is no longer required.

7. Offset Details

Offsetting the impacts of predators, herbivores and climate change will require improving and managing habitat over large areas. In collaboration with Ecological Horizons, Electranet are proposing a number of direct offsets to benefit Malleefowl and their habitat. It is proposed to reduce threats and improve the Malleefowl habitat quality within a 100 ha Offset Area. However, to ensure the habitat improvement outcomes, management activities are proposed over a wider area surrounding, and including the Offset Area. The Management Area is approximately 4,000 ha. Management activities proposed are consistent with priorities included in the National Recovery Plan for Malleefowl. Both the Offset Area and the Management Area are located within the Secret Rocks Nature Reserve. This Nature Reserve is protected through a Heritage Agreement under the South Australian Native Vegetation Act and is also classified as a Class A Nature Reserve under the Federal Government's National Reserve System. The proposed Offset Area and Management Area is shown in Figure 2.

7.1. Offset outcomes and context

The outcome of the Offset Strategy is a net conservation benefit through the improvement of Malleefowl habitat quality and reduction in predation rates by foxes and cats.

Purchase of a land-based offset is not considered to be optimal given the expanse of land already set aside for conservation on the Eyre Peninsula, the majority of which is already formally protected (Figure 4). Active management of these already 'protected' areas to address key threatening processes (unsustainable herbivory from goats, kangaroos, rabbits; elevated predation by foxes and feral cats and elevated fire risk) is considered of higher importance. This view is supported by the Malleefowl Recovery Group, the Eyre Peninsula Landscape Management Board, the South Australian Arid Lands Landscape Management Board and the National Parks and Wildlife Service. Letters of endorsement from these organisations for the management actions outlined in this strategy are included in Section 14 (Appendix A).

The following offset activities, aimed to improve Malleefowl conservation, are proposed to be undertaken in the Management Area (which includes the Offset Area):

- Kangaroo and goat control within the Management Area to reduce browsing damage, increase understorey vegetation and increase food availability and protection from predators for Malleefowl
- Fox/cat control within the Management Area to reduce predation on adult birds and chicks
- Construction of an herbivore barrier fence along the western boundary of the Management Area to prevent reinvasion of kangaroos and goats from cleared farming land where they have access to permanent water
- Monitoring activities to measure the success of the above actions are:
    - Regional mapping of active Malleefowl nesting mounds to determine preferred habitat
    - LiDAR survey to locate additional Malleefowl mounds in areas of preferred habitat
    - Nesting activity (mounds) assessments (with data to National Malleefowl Recovery Team)
    - Long term monthly camera detection rates of cats, foxes, kangaroos and goats within the management area and compared to reference areas.

Note, rabbit control is not planned. Rabbits are at very low abundance in the Management Area as the habitat is Mallee woodland which is not favoured rabbit habitat. Rabbit haemorrhagic disease

virus (RHDV) comes through every year or so and reduces any rabbits present to almost undetectable levels. At such low levels they are very difficult to control and arguably not an issue. Scat count data collected on the Secret Rocks Nature Reserve quadrats shows that over 90% of the grazing pressure is due to kangaroos and goats.

The Management Area and Offset Area are both located in the southwestern corner of the Secret Rocks Nature Reserve. As part of this offset, a barrier fence is proposed to be constructed along the western boundary of the Management Area. The barrier fence will prevent movement and reinvasion of kangaroos and goats between the Management Area and adjacent cropping land with permanent water (but allow movement of small animals such as Malleefowl). The northern boundary of the Management Area will border a future fenced exclusion area that will be completed in 2022. The barrier fence will also contain a spear gate at the northwestern end which will allow one way movement of goats and kangaroos out of the Management Area. The location of both fences will mean that the majority of the northern and western boundaries of the Management Area will be fenced. Refer to Figure 2 for location of the Secret Rocks Nature Reserve. A detailed overview of the Secret Rocks Nature Reserve and Project Area shown in Figure 2.

A number of bushfires burnt through the Secret Rocks Nature Reserve in 2019 and 2020. The bushfire in November 2020 burnt through a small section of the Management Area. This is considered optimal as small burns are thought to be used by Malleefowl for feeding and small burns also act as fire breaks and reduce the risk of large-scale wildfire (a threat to Malleefowl). The boundaries of the fires are shown in Figure 3. A Malleefowl nest, post fire, is shown in Plate 2.

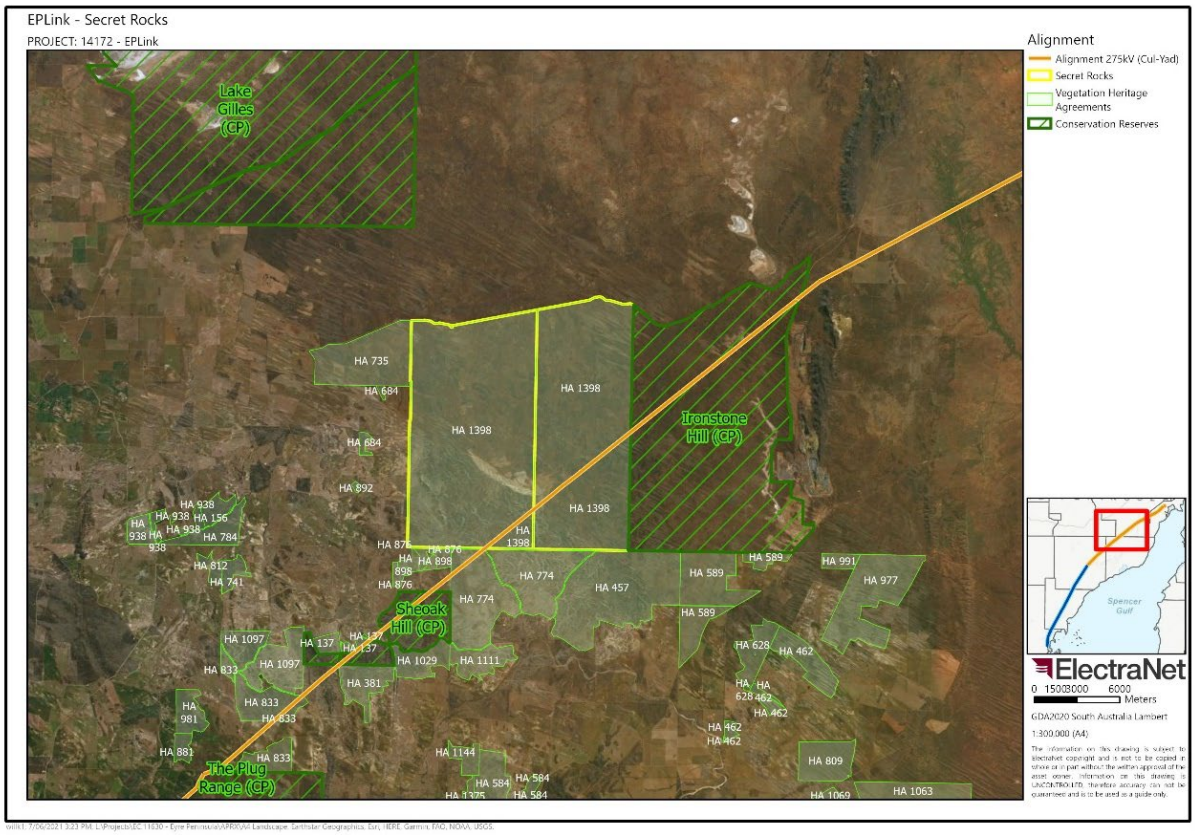

Figure 2: Location of Secret Rocks Nature Reserve and Project Area

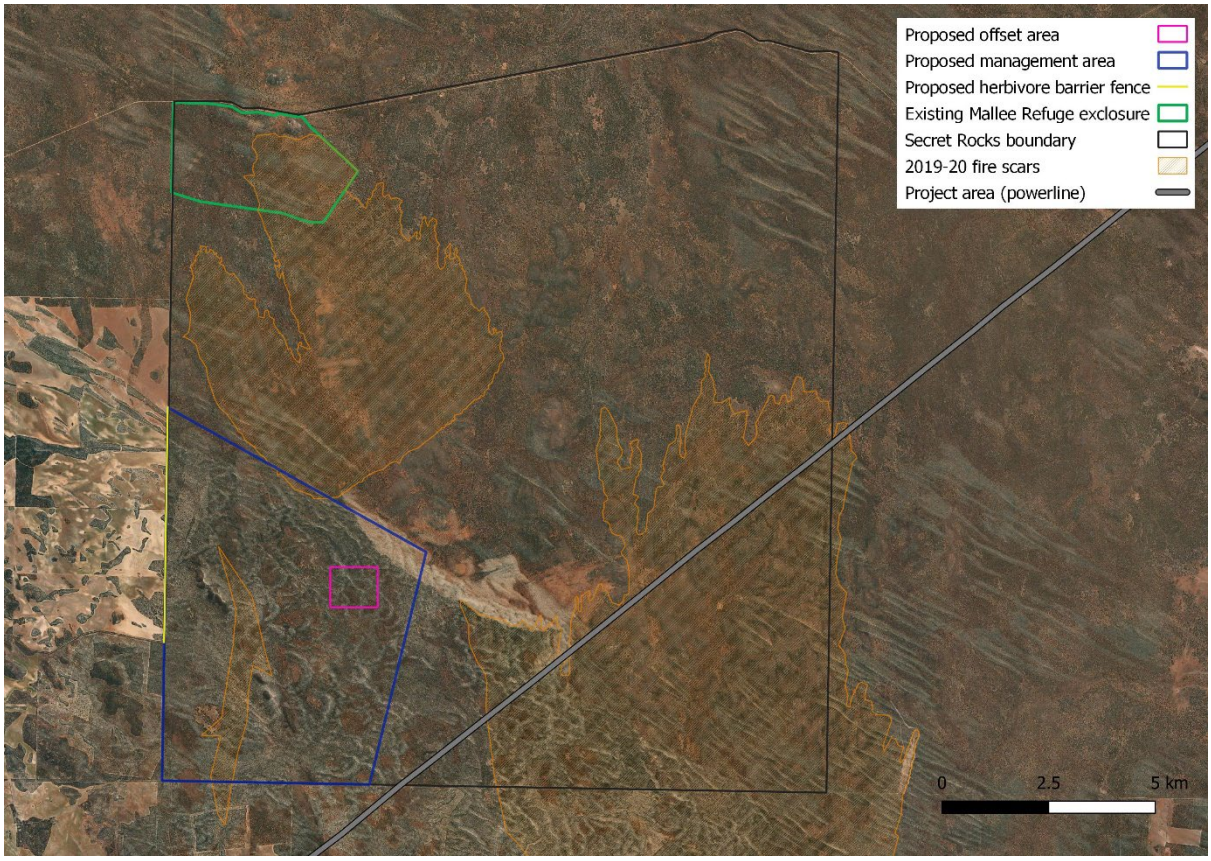

Figure 3: Secret Rocks Nature Reserve showing the proposed Management area (blue), proposed Offset Area (purple), proposed herbivore fence (yellow) and recent bushfires since 2019 (orange shaded area). The northern boundary of the Management Area will border a future fenced exclusion area that will be completed in 2022

Plate 2: A Malleefowl nest post bushfire

Note: (sourced from https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx on 10/06/2021)

Figure 4: Areas of remnant vegetation (pale green) on the Eyre Peninsula (blue star shows location of Offset Area)

Offset activities have been considered with regard to and in support of documentation listed in Table 4. Note that the threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*) (DAE, 2017) has not been included in Table 4 as pigs are not found within the Eyre Peninsula. However, if feral pigs or deer are detected on cameras within the management area they will immediately be targeted for removal through shooting and trapping.

Offset activities are proposed to be undertaken for the life of the approval which is 40 years. This also supports the long timeframes required to reverse declines in habitat quality and the relatively long lifespan of Malleefowl, which may delay initial responses to management.

Table 4: Recovery plan, conservation advice and threat abatement plans relevant to Malleefowl, objectives/criteria/actions and how related to the Offset Strategy.

Objective/Criteria/Priorities	How addressed by the Offset Strategy
National Recovery Plan for Malleefowl (*Leipoa ocellata*)	
1: Reduce permanent habitat loss	Not addressed. Purchase of a land-based offset is not proposed by this Offset Strategy given the amount of Malleefowl habitat already protected within the Eyre Peninsula, South Australia.
2: Reduce the threat of grazing pressure on Malleefowl populations	Addressed. Management actions include control of herbivores within the Management Area (which includes the Offset Area), which will reduce grazing pressure on Malleefowl within the Secret Rocks Nature Reserve.
3: Reduce fire threats	The fenceline on the west side of the Management Area will be maintained as a firebreak. The Management Area includes a small fire scar and is bordered to the east by a larger fire scar which will both reduce the risk of wildfire in the Management Area.
4: Reduce predation	Addressed. Management actions include control of cats and foxes, which will reduce predation on Malleefowl within the Secret Rocks Nature Reserve.
5: Reduce isolation of fragmented populations	Not addressed.
6: Promote Malleefowl-friendly agricultural practices	Addressed. Typical agricultural management results in elevated populations of kangaroos and foxes, especially along the margins of paddocks and scrub. The herbivore barrier fence proposed on the western side of the Management Area, against the boundary of agricultural and remnant vegetation, is an important management activity that will improve the quality of Malleefowl habitat.
7: Reduce mortality on roads	Not addressed.
8: Provide information for regional planning	Addressed. Information gathered will boost local information regarding Malleefowl which will contribute to regional planning information. Mound activity monitoring data will also be added to the National Malleefowl Recovery Team database.
9: Monitor Malleefowl and develop an adaptive management framework	Addressed. Mound activity monitoring will be undertaken, and a LiDAR survey will also be carried out to identify any currently unknown nests and also identify high priority habitat.
10: Determine the current distribution of Malleefowl	Not addressed. The Management Area and Offset Area are located within the current known Malleefowl distribution.

Objective/Criteria/Priorities	How addressed by the Offset Strategy
11: Examine population dynamics: longevity, recruitment and parentage	Partially addressed. Long term Malleefowl population dynamics will be assessed in this additional monitoring site by recording long term mound activity changes over time as well as the presence/absence of Malleefowl through footprints, feathers and scats on mounds. This will allow us to determine if the abundance of Malleefowl is changing as well as the breeding status.
12: Describe habitat requirements that determine Malleefowl abundance	Addressed. A LiDAR survey will be carried out to identify any currently unknown nests and also assist in identification of high priority habitat.
13: Define appropriate genetic units for management of Malleefowl	Not addressed.
14: Assess captive breeding and re-introduction of Malleefowl	Not addressed.
15: Investigate infertility and agrochemicals	Not addressed.
16: Facilitate communication between groups	Not addressed.
17: Raise public awareness through education and publicity	Not addressed.
18: Manage the recovery process	Not addressed.
Threat abatement plan for predation by feral cats	
Objective 1 Effectively control feral cats in different landscapes	Addressed. Active control of feral cats will be undertaken in this Offset Strategy.
Objective 2 Improve effectiveness of existing control options for feral cats	Addressed. Erection of barrier fences on two sides of the Offset Area will increase efficacy of cat and fox control as cats and foxes will preferentially travel along fences where they can be targeted by baiting, trapping and shooting.
Objective 3 Develop or maintain alternative strategies for threatened species recovery	Addressed. The efficacy of cat control along these fences will be assessed by comparing camera detection rates along fences vs away from fences.
Objective 4 Increase public support for feral cat management and promote responsible cat ownership	Not addressed.
Threat abatement plan for competition and land degradation by unmanaged goats	
Objective 1 Prevent unmanaged goats occupying new areas in Australia and eradicate them from high-conservation-value 'islands'	Addressed. Offset Strategy actions includes control of goats within the Secret Rocks Nature Reserve.
Objective 2 Promote the maintenance and recovery of native species and ecological communities that are affected by competition and land degradation by unmanaged goats	Addressed. Offset Strategy is focussed on improving habitat quality of Malleefowl by controlling goats.

Objective/Criteria/Priorities	How addressed by the Offset Strategy
Objective 3 Improve knowledge and understanding of unmanaged goat impacts and interactions with other species and other ecological processes	Not addressed.
Objective 4 Improve the effectiveness, target specificity, integration and humaneness of control options for unmanaged goats	Addressed. The effectiveness of the barrier fences and spear gates will be assessed to determine their benefit for passively controlling goat numbers, a technique that if successful could be replicated in other areas of prime Malleefowl habitat.
Objective 5 Increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control unmanaged goats	Addressed. Photopoints established within the Offset Area will enable the benefits of herbivore management to be tracked and used for awareness and demonstration purposes.
Threat Abatement Plan for predation by the European Fox	
Objective 1 Prevent foxes occupying new areas in Australia and eradicate foxes from high-conservation-value 'islands'	Not addressed. Foxes will be controlled within the Management Area but not eradicated.
Objective 2 Promote the maintenance and recovery of native species and ecological communities that are affected by fox predation	Addressed. The Offset Strategy aims to reduce pressure from foxes through fox baiting and promote recovery of native species, in particular Malleefowl.
Objective 3 Improve knowledge and understanding of fox impacts and interactions with other species and other ecological processes	Addressed. Knowledge gained from activities proposed as part of this Offset Strategy will increase understanding of fox impacts on native species in the Management Area. In particular, camera detection rates will enable us to determine how effective baiting is for fox control and the reduction in fox detections needed to see an increase in Malleefowl activity.
Objective 4 Improve the effectiveness, target specificity, integration and humaneness of control options for foxes	Not addressed.
Objective 5 Increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control and manage foxes	Not addressed.
Threat Abatement Plan for competition and land degradation by rabbits	
Objective 1 Strategically manage rabbits at the landscape scale and suppress rabbit populations to densities below threshold levels in identified priority areas	Addressed. Rabbit abundance within the Management Area is very low (<1% detection rates on cameras) as the area is mallee shrubland which is not preferred habitat for rabbits. Over 1,000 rabbit warrens were ripped 10 years ago in the region (mainly surrounding farmland) where rabbits were in higher abundance but no rabbit control has been conducted in the Management Area as the habitat is poor for rabbits. However, if rabbit abundance reaches detection rates of 5% on camera then active searches will occur for warrens and fumigation will be implemented

Objective/Criteria/Priorities	How addressed by the Offset Strategy
Objective 2 Improve knowledge and understanding of the impact of rabbits and their interactions with other species and ecological process	Addressed. Camera trap data will be used to compare rabbit detection rates with detection rates of other fauna to determine if there is an association between any species.
Objective 3 Improve the effectiveness of rabbit control programs	Not addressed.
Objective 4 Increase engagement of, and awareness by, the community of the impacts caused by rabbits, and the need for integrated control	Not addressed.
Eyre Peninsula Landscape South Australia Business Plan 2021-2022	
Focus area – supporting landowners to control prioritised pest plants and animals	Addressed. Control pest animals will be undertaken as part of management actions in the Offset Strategy.
Focus area – Maintain and enhance biodiversity in prioritised ecosystems	Addressed. Actions undertaken in the Offset Strategy will improve habitat quality and increase populations of Malleefowl.
Arid Lands Landscape South Australia Business Plan 2021-2022	
Key Project – Bounceback and Beyond	Addressed. Actions undertaken in the Offset Strategy support the objectives of the Bounceback and Beyond project.

7.2. Habitat quality assessment

Three factors are considered in the Habitat Quality Scoring for Malleefowl (DAWE):

- Site condition
- Site context, and
- Species stocking rate

The Habitat Quality Scoring for Malleefowl has been assessed and is summarised in Table 5. The full assessment, with supporting information, can be found in Appendix A.

Table 5: Summary of Habitat Quality Scoring for Malleefowl

	Impact site	Offset Area start	Offset Area without offset	Offset Area with offset (at 20 years)
Site Condition (score out of 3)	2	2	1.5	2.5
Site context (score out of 3)	2.5	2.5	2.5	2.5
Species stocking rate (score out of 4)	3	3	2	4
TOTAL	7.5	7.5	5	9

7.3. Offset activities

It is noted that the Environmental Offsets Policy specifically requires that any offset activities are additional to what is already required, determined by law or planning regulations or under other schemes or programs. Condition 9 of the EPBC approval EPBC 2019/8583, requires that fox baiting be undertaken biannually, and cat baiting be conducted annually in all areas of Malleefowl habitat along the corridor. Note that baiting related to this condition would be undertaken along the transmission line corridor (100 m) only. The herbivore and predator control efforts referred to in this Offset Strategy are in addition to those specified in the approval and will be undertaken within the 4,000 ha Management Area. The Heritage Agreement placed over the Secret Rocks Nature Reserve requires that the native vegetation is not cleared, and that domestic stock grazing is prohibited. Table 6 details the proposed offset activities and provides additional detail of each activity.

Table 6: Offset Strategy activities and additional detail

Potential Activity	Detail
Kangaroo and goat control within the Management Area	Control activities (shooting by experienced and licensed shooters under permits) will be undertaken annually for the first 20 years. Efforts will be undertaken within the 4,000 ha Management Area (includes the Offset Area).
Construction of an herbivore barrier fence between the cropping land and nature reserve	A 5.5 km fence will be constructed which will provide a barrier between cropping land on the western boundary of the Management Area and the nature reserve. The barrier fence is proposed to be constructed in Year 1. Construction of barrier fences has been known to reduce herbivore movement and vegetation impact on protected land and therefore will reduce the required frequency of control activities (Russell *et. al.* 2011). Barrier fence will also include a one-way spear gate which will passively remove kangaroos and goats from the Management Area to the adjacent cropping land and assist with mustering activities (Plate 3).
Fox/cat control within the Management Area	Activities include control efforts (poison 1080 baiting at five baits per square km or Felixer Grooming Traps) every 4 months for the first 20 years. Efforts will be undertaken within the 4,000 ha Management Area (includes the Offset Area).
Monitoring – Detection of cat/fox and herbivores	Activities include the annual assessment for the first 20 years of existing remote cameras within and adjacent to the Management Area to determine the detection rate of cats/foxes and herbivores (goats and kangaroos).

Potential Activity	Detail
Monitoring – Mapping of active mounds	Monitoring will support existing data on Malleefowl activity on mounds collected over the last 12 years. Mapping of high-quality habitat will be undertaken with reference to active mounds and using vegetation mapping and elevation data. Information collected will then inform LiDAR monitoring within the 4,000 ha Management Area (includes the Offset Area) to determine if high quality habitat can be predicted. A LiDAR survey will be undertaken in year 1. Following the LiDAR survey, any likely mounds will be ground truthed.
Monitoring – Mound activity	Nest mounds (Plate 4) within the Offset Area would be monitored every second year for the first 15 years and then every five years for the life of the offset activities (40 years, approx. seven mounds). Mound activity would be compared with management actions.
Photopoints	Photopoints will be established and monitored every second year for the first 15 years and then every five years for the life of the offset activities (40 years).

Plate 3: Kangaroo moving through a spear gate.

Plate 4: A typical inactive Malleefowl nest located within the Secret Rocks conservation area within 5 km of the offset area

7.4. Malleefowl (*Leipoa ocellata*)

Malleefowl (Plate 5) are nationally listed birds that were once widespread across the Eyre Peninsula. Historical land clearing for agriculture removed high quality habitat and recent declines have continued likely due to widespread bushfires, invasive predators, overabundant herbivores and possibly increased heat waves.

The northern extent of the Project Area consists of good quality vegetation (high native species and structural diversity and low to nil weed cover) and overlaps with the known habitat range of Malleefowl. Malleefowl have been recorded within the Project Area (development footprint as shown in Figure 1) with several active mounds recorded throughout mallee associations in the northern extent of the Project Area in 2013/14. Additional mounds and activity have been recorded within 2 km of the Project Area since 2012. The stand of Mallee is large and mostly intact (ie not fragmented). More recently, a fresh Malleefowl track was observed by EBS Ecology in September 2019 (EBS Ecology, 2019), a radiotagged Malleefowl frequently traversed the Project Area in 2020 (unpublished data Stenhouse and Moseby unpublished data) and a recorded sighting of a Malleefowl in the Project Area was recorded by Downer personnel in August 2021 (pers. comm. K Moseby). Refer to Figure 5 for a map showing Malleefowl activity.

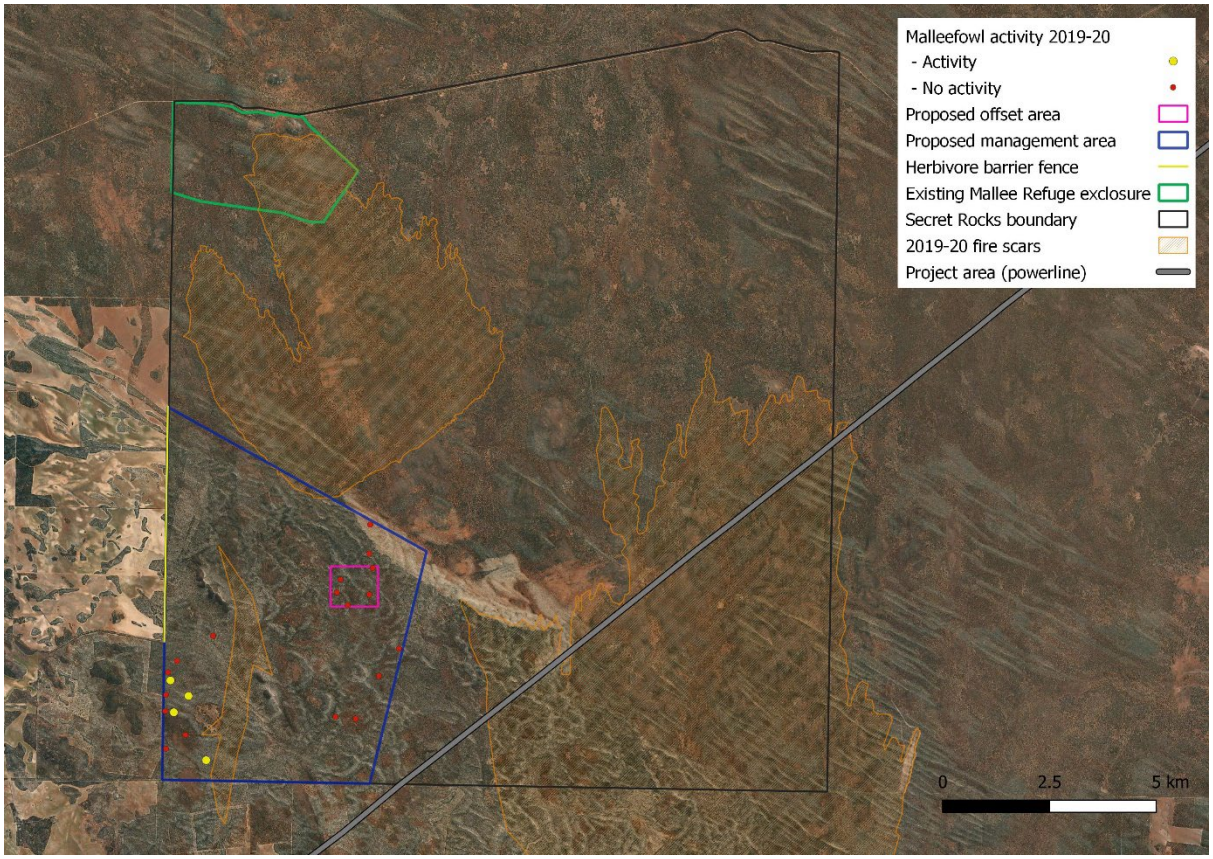

Figure 5: Malleefowl nest mound activity in 2019 and 2020 within the proposed Management Area

7.5. Secret Rocks Nature Reserve

Ecological Horizons is a private ecological research, adaptive management and environmental consulting company directed by Dr Katherine Moseby and Dr John Read. Ecological Horizons owns the Secret Rocks Nature Reserve, a 259 square kilometre area of mallee scrub, which has been placed under a conservation covenant (Heritage Agreement). The location of Secret Rocks is shown in Figure 2.

Ecological Horizons have been monitoring Malleefowl on the Eyre Peninsula for more than 12 years including annual monitoring of mound activity for over 300 mounds. They have also conducted research into causes of population decline including monitoring movement and survival of radiotagged Malleefowl, conducting statistical analysis of causes of decline in breeding rates and determining the effects of herbivore exclusion on vegetation cover. Results suggest that, despite a large proportion of uncleared vegetation on the Eastern Eyre Peninsula being currently protected under Heritage Agreement or National Park Estate (more than 44%), Malleefowl continue to decline even within large protected areas (National Malleefowl Database, Stenhouse, Read and Moseby unpub data). Causes of death in eight radiotagged birds on the Eyre Peninsula included fox and cat predation and drought/extreme heat (Stenhouse and Moseby unpub data). Tagged birds were able to move more than 10-15 km to access suitable habitat even within cleared agricultural landscapes but kangaroos and goats significantly reduced understorey vegetation cover in native scrub increasing exposure of Malleefowl to predators and reducing key food plants. Statistical analysis suggests climate change will likely further impact Malleefowl by increasing the frequency of extreme heat and drought events as well as the incidence of large wildfires. Malleefowl are unable to breed in burnt

areas until at least 20 years post fire. However, Malleefowl are thought to use recently burnt areas to feed suggesting that a mosaic of fire age may benefit them.

An exclusion area (Mallee Refuge) has also been fenced in the northwestern corner of the Secret Rocks Nature Reserve. Goats, kangaroos, cats and foxes have been removed from the exclusion zone. Grazing impacts of these animals is shown in Plate 6 and Plate 7. Following fencing and removal of large herbivores, regeneration of native vegetation has occurred (Plate 8 and Plate 9). An additional exclusion area is planned to be installed in 2022 which will border the Management Area to the north and provide additional protected habitat for Malleefowl.

Plate 5: Adult Malleefowl on a nest mound in typical habitat on Eyre Peninsula

Plate 6: Goat browse lines on Sandalwood (SA State Listed) (photo taken within 1km of the management area)

Plate 7: Kangaroo browsing on Chalky Wattle (*Acacia cretacea*) (listed as threatened under EPBC) (photo taken within 1km of the management area)

Plate 8: Mallee Refuge exclusion fence showing regeneration inside exclosure

Plate 9: Kangaroo and goat exclosures have demonstrated the impacts of these species on native plants within the Secret Rocks Nature Reserve

8. Monitoring Program

Monitoring activities are based around assessment of the success of management activities. Coordination and implementation of monitoring activities will be undertaken by Ecological Horizons. Management activities which control and reduce populations of predators and herbivores will reduce predation pressure and resource competition for Malleefowl. This in turn, will improve the quality of habitat, and increase the population size and reproductive effort and success of Malleefowl. This would be reflected in an increase in the number of nests or activity detected at nest mounds.

A number of monitoring activities will be implemented, as follows:

- Monitoring of Malleefowl nest activity, using the National Malleefowl Recovery Team Monitoring Manual
- Mapping of new Malleefowl nests using LiDAR aerial imagery and ground searches
- Monitoring of detection rates of cats/foxes and herbivores (goats and kangaroos) using camera traps
- Assessment of habitat quality for Malleefowl (track habitat quality score improvement to reach final completion criteria – see Table 5).
- Photopoints

To contextualise the monitoring triggers presented in Table 8, Detection rates will be monitored using remote cameras which have been in place within the Secret Rocks Nature Reserve since 2013 and additional ones which will be established as part of the Offset Strategy.

A number of monitoring triggers are presented in Table 8. The increases presented will be assessed using information collected from camera traps. Camera traps will assess detection rates within the Management Area and in reference areas adjacent to the Management Area, where no cat and fox control actions (ie baiting) have been undertaken. These reference areas will form the baseline. Detection rates are highly influenced by seasonal conditions, so a percent reduction in comparison with a reference area allows for a more accurate indication of baiting success. The difference between the managed and unmanaged areas over time will be reported on.

Detection rates in the region have been recorded as high as 20% for foxes and 7% for cats in baited areas. Rates in unbaited areas are likely to be much higher.

Baiting currently occurs within the Secret Rocks Nature Reserve, however this is unfunded and is due to finish in mid 2022. Offset activities will ensure that baiting continues into the longer term and continue to support reducing predation pressure on Malleefowl.

The monitoring schedule is shown in Table 9.

8.1. Using remote cameras for detection

Remote cameras are automatically activated when movement is detected. They are a widely accepted and effective way to monitor both native and introduced species of fauna (Read *et. al*. 2015 and Meek *et. al.* 2012). The detection rate is calculated as the total number of detections of a species (a detection is a photo of an animal at least 10 min from a previous photo of the same species to ensure independent detections) divided by the total number of trap nights x total number of cameras (multiplied by 100 to get a percentage). This gives an indication of relative activity of each species over time and is widely used to look at trends in a range of species.

8.2. Malleefowl mound activity monitoring

Activity at mounds is assessed using a methodology developed and implemented by the National Malleefowl Recovery Team (NMRT, 2020). The methodology measures a number of characteristics of the mound and surrounds, including tracks, eggshell presence, scats, dimensions and if currently active. All data is loaded into the National Malleefowl Recovery Team database via the electronic datasheet in the app CyberTracker. Although the method is mainly used to determine if a mound is being used for nesting, results can also be used to measure presence of Malleefowl (scats, tracks) at a mound and therefore local presence/absence of the species regardless of breeding.

8.3. LiDAR aerial imagery assessments

The use of LiDAR aerial imagery has been used successfully by the National Malleefowl Recovery Group, including the assessment of nests in the Great Victoria Desert (National Malleefowl Recovery Group 2020 and Anditi 2021a). It has also been used in the local area by Electranet to locate mounds in the Project Area and adjacent areas. Over 80 mounds have already been successfully located using LiDAR in the region (Read *et al.* 2014). An example of imagery of an automated Malleefowl mound is shown in Plate 10.

8.4. Habitat quality for Malleefowl

Every second year, following the completion of the Malleefowl mound activity monitoring, the Habitat Quality Scoring for Malleefowl (DAWE) will be reassessed. This will be undertaken to assess current habitat quality and how this differs from the habitat quality that was predicted at the commencement of the approval.

Veg machine (www.vegmachine.com) will be used to compare vegetation cover in the Management Area polygon with reference area polygons in similar vegetation to the north or west (where no control of kangaroos is undertaken). Vegetation cover over time in the Management Area will increase relative to the reference area. Vegetation cover is highly dependent on seasonal conditions. Photopoints will also be established to show vegetation cover on both sides of the barrier fence, which will show any difference in cover.

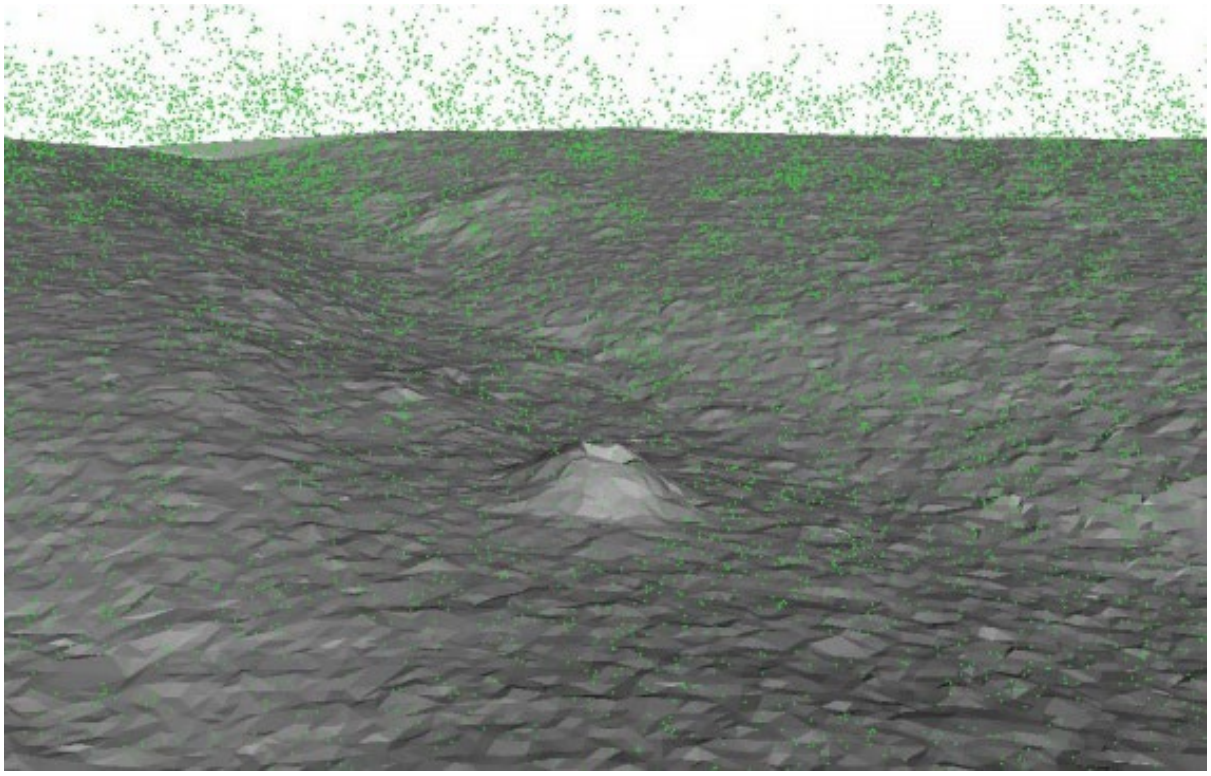

Plate 10: Example of automated Malleefowl mound automation using LiDAR aerial imagery (Anditi 2021b)

Table 7: Description of monitoring activities

Parameter	Methodology	Location	Frequency	Management Trigger	Management Action
Herbivore (goat and kangaroo) detections	Using existing remote cameras to determine the detection rate of herbivores.	There are two existing cameras located around the perimeter of the Management Area which will be used to infer abundance of herbivores within the Offset Area. An additional four cameras will also be installed to support monitoring.	Photos from remote cameras will be assessed annually for the first 20 years.	Reduction from reference area of less than 15% across management area at 5 years; reduction from reference area of less than 30% at 10 years; reduction from references area of less than 50% at 15 years	One additional round of shooting/trapping implemented per year until detections are below the trigger value.
Cat and fox detections	Using existing remote cameras to determine the detection rate of cats and foxes.	There are two existing cameras located around the perimeter of the Management Area which will be used to infer abundance of cats and foxes within the Offset Area. An additional four cameras will also be installed to support monitoring.	Photos from remote cameras will be assessed annually for the first 20 years.	Reduction from reference area of less than 15% across management area at 5 years; reduction from reference area of less than 30% at 10 years; reduction from references area of less than 50% at 15 years	Control activities increased (cage trapping, shooting, additional hand baiting) until numbers are below the trigger value.

Parameter	Methodology	Location	Frequency	Management Trigger	Management Action
LiDAR survey to detect mounds	Using LiDAR aerial imagery and data processing to determine potential nests not previously recorded. Mounds located will be added to the mound activity monitoring program and will set the baseline for ongoing mound monitoring.	Aerial imagery will be collected for the Management Area (which includes the Offset Area).	Aerial imagery and associated assessment will be undertaken during year 1 to identify all mounds within the Management Area which will form the basis of ongoing monitoring.	N/A	N/A
Monitoring of nest mound activity	Known nests will be visited and physical and activity characteristics are measured.	Monitoring of nests will be undertaken within the Offset Area.	Monitoring of Malleefowl presence and nest activity will be undertaken every two years for years 1-15 and then every five years.	Percent of nests with recorded Malleefowl presence declines by 25%, not clearly associated with seasonal conditions.	Check herbivore and predator detection rates and increase threshold for triggers for additional management in table 8 above to 25% at 5 years, 50% at 10 years. This will be checked again after 5 years and thresholds increased as required.
Photopoints	Ten Photopoints will be established at Malleefowl mounds within the Offset Area and Management Area. Photos will be captured at regular intervals (see frequency).	Within the Offset Area and Management Area.	Photopoints will be captured every two years for years 1-15 and then every five years. Photos will be taken facing the mound and away from the mound to capture habitat	A decline of more than 20% in groundcover vegetation (<1m high) over a ten year period (to allow for seasonal/extreme weather fluctuations).	One additional round of shooting/trapping implemented per year until vegetation cover improves on an increasing trajectory.

NOTE: Figures in Management Trigger column represent the average camera detection rates on 10 cameras (total number of detections divided by total number of trap nights x total number of cameras).

Table 8: Monitoring schedule

Year #	Year	Herbivore Detections	Cat/Fox Detections	LiDAR Survey	Nest Mound Activity	Photopoints
1.	2022	X	X	X	X	X
2.	2023	X	X			
3.	2024	X	X		X	X
4.	2025	X	X			
5.	2026	X	X		X	X
6.	2027	X	X			
7.	2028	X	X		X	X
8.	2029	X	X			
9.	2030	X	X		X	X
10.	2031	X	X			
11.	2032	X	X		X	X
12.	2033	X	X			
13.	2034	X	X		X	X
14.	2035	X	X			
15.	2036	X	X		X	X
16.	2037	X	X			
17.	2038	X	X			
18.	2039	X	X			
19.	2040	X	X			
20.	2041	X	X		X	X
21.	2042					
22.	2043					
23.	2044					
24.	2045					
25.	2046				X	X
26.	2047					
27.	2048					
28.	2049					
29.	2050					
30.	2051				X	X

Year #	Year	Herbivore Detections	Cat/Fox Detections	LiDAR Survey	Nest Mound Activity	Photopoints
31.	2052					
32.	2053					
33.	2054					
34.	2055					
35.	2056				X	X
36.	2057					
37.	2058					
38.	2059					
39.	2060					
40.	2061				X	X

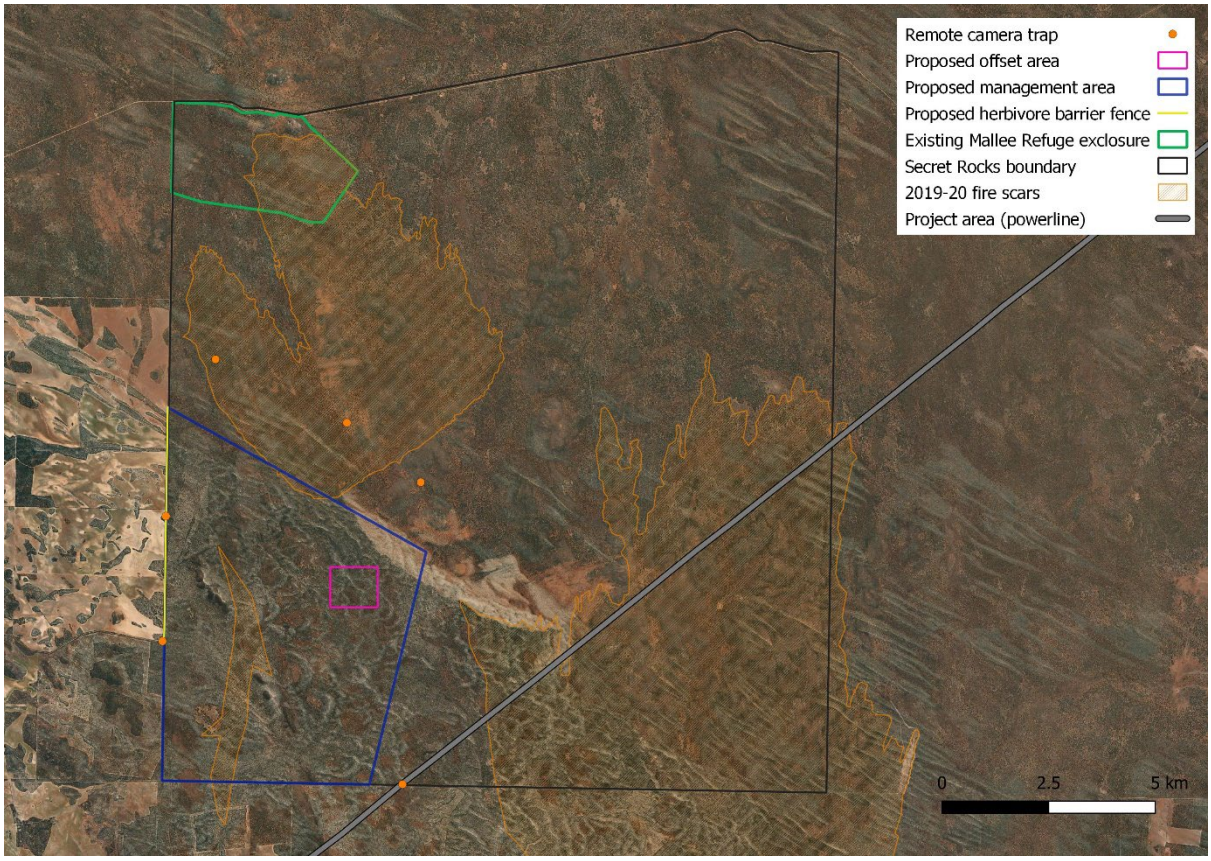

Figure 6: Map of the Management Area and Offset Area, showing location of the remote cameras in orange (two southern most cameras are existing cameras, while 4 northern cameras will be installed)

9. Risk Assessment and Management

Risks related to the Offset Strategy are detailed in Table 12. The risk assessment was undertaken using the risk assessment materials provided by DAWE and shown in Table 10 and Table 11.

Table 9: Risk framework matrix

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table 10: Likelihood and consequence

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor risk of failure to achieve the objectives of the plan/strategy. Results in short term delays to achieving plan/strategy objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the objectives of the plan/strategy. Results in short term delays to achieving plan/strategy objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the objectives of the plan/strategy. Results in medium-long term delays to achieving plan/strategy objectives, implementing uncertain, high cost/effort corrective actions.
Major	plan/strategy objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	plan/strategy objectives are unable to be achieved, with no evidenced mitigation strategies.

Table 11: Risk assessment

Objective	Event/ Circumstance	Risk Rating			Mitigation Measure	Residual Risk Rating			Monitoring Activity	Management Trigger	Contingency Measures
		Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level			
Improve habitat for Malleefowl within the offset area	Unplanned fire causes a reduction in habitat quality in the Offset Area	Possible	Moderate	Medium	Maintain fire break to the north and east of Offset Area	Unlikely	Moderate	Low	Annual inspection of fire breaks	Unplanned fire	Maintain fire access tracks Review fire management measures
	Frequency of herbivore control is not effective at reducing numbers of herbivores	Possible	Moderate	Medium	Increase frequency of control efforts, change or add additional control techniques such as Judas goats, more spear gates, increased shooting	Unlikely	Minor	Low	Detection rate of herbivores and cats/foxes using remote cameras	Detection rate of kangaroos >25% Detection rate of goats >5%	Increase frequency of control efforts
	Frequency of cat/fox control is not effective at reducing number of cats/foxes	Possible	Moderate	Medium	Increase frequency of control measures from 3x a year to 4x a year. Increase size of controlled area	Unlikely	Minor	Low	Detection rate of herbivores and cats/foxes using remote cameras	Detection rate of cats >2% Detection rate of foxes >2%	Increase frequency of control efforts
	Barrier fence is not effective at reducing kangaroos in the Management Area	Possible	Minor	Low	Check and maintain barrier fence every three months	Unlikely	Minor	Low	Annual inspection of barrier fence and spear gate to confirm integrity	Damaged fence	Reinstate damaged fence within 1 month

Objective	Event/ Circumstance	Risk Rating			Mitigation Measure	Residual Risk Rating			Monitoring Activity	Management Trigger	Contingency Measures
		Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level			
	Unauthorised access by vehicles or stock causing reduction in habitat quality	Possible	Minor	Low	Secret Rocks Nature Reserve property fence Barrier fence No unauthorised access signage in place Access along powerline blocked by fence and locked gates	Unlikely	Minor	Low	Annual fence check of property fence and barrier fence	Damaged fence	Reinstate damaged fence within 1 month
	Presence of Malleefowl is not recorded	Possible	Major	High	Malleefowl known to be present in the area so continue monitoring for 5 years before implementing additional actions if required. Consider reintroduction of Malleefowl or tagging Malleefowl in adjacent areas to understand why the area is not being used by Malleefowl	Unlikely	High	Medium	Malleefowl mound activity monitoring	Monitoring indicates unsuitable habitat through habitat assessment	Review with DAWE at 5 years from approval of offset strategy. If Malleefowl not found to be present within offset area, source alternative offset site

10. Adaptive Management Framework

The Offset Area is located within the Secret Rocks Nature Reserve, which is owned and managed by Ecological Horizons. Ongoing research and experimentation are undertaken by Ecological Horizons in relation to Malleefowl, feral animal and pest species control and also other listed species. Ecological Horizons is also actively involved with government bodies responsible for management of Malleefowl and the National Malleefowl Recovery Team. If new monitoring or control techniques are developed during the approval period and supported by government or the National Malleefowl Recovery Team, these may be implemented and may support or replace the monitoring and control methods detailed in this Offset Strategy.

Collation and review of monitoring data and the habitat quality assessment will be completed within six months of completion of each session of Malleefowl mound activity monitoring. The review will assess the success of the Offset Strategy and progress towards achievement of the outcomes. Frequency of Malleefowl mound activity monitoring is shown in Table 9. The review process will also consider potential new monitoring and control techniques and include these in the Offset Strategy as appropriate.

Where management triggers are reached for any management action, contingency responses will be enacted to address the triggers, and monitoring of responses will be undertaken (Table 12). If contingency responses do not address problems, alternative responses will be considered and updated in this Offset Strategy, as needed. If an alternative offset is required, the approval holder will consult with DAWE to determine an appropriate site to meet the requirements of the approval.

When new, additional or alternative management approaches are proposed to be implemented, this Offset Strategy will be revised and updated, and submitted to DAWE, for approval by the Minister.

11. Consideration of impacts on EPBC-listed species

A Protected Matters Report (PMR) was undertaken for a central point in the Management Area and within a 10km radius. No threatened ecological communities, 14 listed threatened species and 11 migratory species were recorded (Table 13). Only three have been recorded from the Management Area and these are likely to benefit from any reduction in grazing and predation pressure.

In addition to the PMST results shown in Table 13, Yellow Swainson-pea (*Swainsona pyrophila*), listed as Vulnerable, has been recorded within the Secret Rocks Nature Reserve.

No negative impacts are expected from proposed offset activities. Other fauna species, and in particular listed Sandhill Dunnart and Rufous Grasswren are likely dependent upon on old growth Triodia and will likely benefit from herbivore (particularly Euro) control post fire. Predator control will also assist resident species as cats and foxes prey on a wide range of mammal, bird and reptile species.

Table 12: Protected matters report results. Species recorded in Management Area are underlined (Ecological Horizons, unpublished data)

Name	Status	Type of presence
Birds		
Amytornis textilis myall (Western Grasswren (Gawler Ranges))	Vulnerable	Species or species habitat likely to occur within area. No records exist from the Management Area despite active searches
Calidris ferruginea (Curlew Sandpiper)	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos (Grey Falcon)	Vulnerable	Species or species habitat likely to occur within area. One record (J Read unpublished data) from 1km north of Offset Area.
Grantiella picta (Painted Honeyeater)	Vulnerable	Species or species habitat may occur within area
***Leipoa ocellata* (Malleefowl)**	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis (Eastern Curlew, Far Eastern Curlew)	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus (Plains-wanderer)	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis (Night Parrot)	Endangered	Extinct within area
Rostratula australis (Australian Painted Snipe)	Endangered	Species or species habitat may occur within area
Mammals		
***Sminthopsis psammophila* (Sandhill Dunnart)**	Endangered	Species or species habitat likely to occur within area. Species has been recorded within 1km.
Plants		
Caladenia tensa (Greencomb Spider-orchid, Rigid Spider-orchid)	Endangered	Species or species habitat likely to occur within area
Olearia pannosa subsp. pannosa (Silver Daisy-bush, Silver-leaved Daisy, Velvet Daisy-bush)	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of presence
Pterostylis mirabilis (Nodding Rufoushood)	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		
Apus pacificus (Fork-tailed Swift)	Migratory Marine	Species or species habitat likely to occur within area
Motacilla cinerea (Grey Wagtail)	Migratory Terrestrial	Species or species habitat may occur within area
Motacilla flava (Yellow Wagtail)	Migratory Terrestrial	Species or species habitat may occur within area
Actitis hypoleucos (Common Sandpiper)	Migratory Wetlands	Species or species habitat may occur within area
Calidris acuminata (Sharp-tailed Sandpiper)	Migratory Wetlands	Species or species habitat may occur within area
Calidris ferruginea (Curlew Sandpiper)	Migratory Wetlands	Species or species habitat may occur within area
Calidris melanotos (Pectoral Sandpiper)	Migratory Wetlands	Species or species habitat may occur within area
Charadrius veredus (Oriental Plover, Oriental Dotterel)	Migratory Wetlands	Species or species habitat may occur within area
Gallinago hardwickii (Latham's Snipe, Japanese Snipe)	Migratory Wetlands	Species or species habitat may occur within area
Numenius madagascariensis (Eastern Curlew, Far Eastern Curlew)	Migratory Wetlands	Species or species habitat may occur within area
Pandion haliaetus (Osprey)	Migratory Wetlands	Species or species habitat may occur within area

12. Document Review, Reporting and Auditing and Accountabilities

Document review, reporting, auditing and accountabilities for each of the actions, and including frequency, are shown in Table 14.

Table 13: Actions, frequency and accountabilities

Actions	Frequency	Accountability
Publishing of Offset Strategy	The approved Offset Strategy will be published on the approval holder's website within 20 business days of approval.	Electranet
Implementation of Offset Strategy	Within 3 months of approval of Offset Strategy. The approved Offset Strategy will be published on the approval holder's website.	Electranet
Coordination and implementation of management actions	Following completion of reporting and analysis of monitoring activities, management actions will be determined and implemented. See Reporting below in table for frequency of reporting.	Electranet and Ecological Horizons
Coordination and completion of monitoring activities	Refer to Table 9	Electranet and Ecological Horizons
Document review	Within six months of completion of Malleefowl mound activity monitoring and when new or changed approaches to offset management are being proposed, this Offset Strategy should be revised and submitted for approval by the Minister.	Electranet and Ecological Horizons
Reporting	Within six months of completion of Malleefowl mound activity monitoring In accordance with approval condition 20, an annual report on compliance with approval conditions will be provided to DAWE every year on the anniversary of commencement, i.e. 25 March each year. This will include reporting on offset implementation and management, in accordance with this Offset Strategy.	Electranet and Ecological Horizons
Audit	Within 6 months of completed of report An independent audit of compliance with conditions will be undertaken in accordance with approval conditions 23 to 25, if required.	Electranet and Ecological Horizons

13. References

Anditi (2021a). Great Victoria Desert LiDAR Malleefowl Mound Detection. https://www.anditi.com/case-study/great-victoria-desert, accessed on 31/08/2021.

Anditi (2021b). Proposal for the Malleefowl survey – Eyre Peninsula in South Australia near Kimba. Anditi, NSW.

Birds SA (2020). Malleefowl-26-05-2020.png (2480×2834) (birdssa.asn.au) accessed on 30/08/2021.

Brandle R., Mooney T. & de Preu N. (2018). Broadscale feral predator and herbivore control for yellow-footed rock-wallabies *Petrogale xanthopus* ssp. *xanthopus*: improved resilience for plants and animals = Bounceback. In: *Recovering Australian Threatened Species: a Book of Hope* (eds S. Garnett, P. Latch, D. Lindenmayer and J. Woinarski) pp. 135-46. CSIRO Publishing, Collingwood, Australia.

Commonwealth of Australia (2012). Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy, October 2012.

DE (2015). Threat abatement plan for predation by feral cats. Department of the Environment, Commonwealth of Australia, 2015.

DAE (2017). Threat abatement plan for predation, habitat degradation, competition and disease transmission (*Sus scrofa*). Department of Environment and Energy.

DAWE (2021). Malleefowl. Malleefowl | Department of Agriculture, Water and the Environment, accessed on 01/09/2021.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Threat abatement plan for predation by the European red fox, DEWHA, Canberra.

EBS Ecology (2019). Eyre Peninsula Transmission Line Native Vegetation Assessment. Prepared by EBS Ecology for Electranet, version 2. December 2019.

Kinnear J. E., Onus M. L. & Sumner N. R. (1998). Fox control and rock-wallaby population dynamics - II. An update. *Wildl. Res.* **25**, 81-8.

Meek PD, Ballard AG, and Fleming PJS (2012). 'An Introduction to Camera Trapping for Wildlife Surveys in Australia.' (Invasive Animals CRC: Canberra.)

Moseby KE and Hill BM (2011). The use of poison baits to control feral cats and red foxes in arid South Australia 1. Aerial Baiting Trials. Wildlife Research 38:338-349.

Moseby KE, Read JL and Anderson G (2021). Goat movement patterns inform management of feral goat populations in semiarid rangelands. Wildlife Research 48:44-54.

National Malleefowl Recovery Group newsletter (2020), https://www.nationalmalleefowl.com.au/malleefowl-mounds-in-the-great-victoria-desert, accessed on 31/08/2021.

NMRT (2020). National Malleefowl Monitoring Manual – Standards, Protocols and Monitoring Procedures. National Malleefowl Recovery Team. Edition 2020_1.

Read JL, Bengsen AJ, Meek PD and Moseby KE (2015). How to snap your cat: optimum lures and their placement for attracting mammalian predators in arid Australia. Wildlife Research 42:1-12.

Read J, Moseby KE and Landers M (2014). Comparison of three survey techniques for locating Malleefowl mounds. Proceedings of the 5th National Malleefowl Forum, Dubbo, NSW.

Russell BG, Letnic M and Fleming PJS (2011). Managing feral goat impacts by manipulating their access to water in the rangelands. The Rangeland Journal 33:143-152.

14. APPENDIX A – Letters of Endorsement

Government of South Australia
South Australian Arid Lands
Landscape Board

3 June 2021

SA Arid Lands Landscape Board
Railway Station Stirling Road
PORT AUGUSTA SA 5700
PO Box 297
Port Augusta SA 5700
Tel 08 8648 5300
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saal.landscapeboard@sa.gov.au
landscape.sa.gov.au

Thomas Smith
Post Approvals Section
Department of Agriculture, Water and the Environment
GPO Box 787
Canberra ACT 2601

Dear Mr Smith,

RE: Letter of support for Malleefowl management area offset for Eyre Peninsula Transmission Line

The South Australian Arid Lands Landscape Board supports the application from Electranet and Ecological Horizons for their joint proposed Malleefowl management area offset plan. The plan aims to offset land disturbance activities associated with the construction of the new Eyre Peninsula Powerline.

We have been collaborating with Dr Katherine Moseby and Dr John Read for a number of years, to collect and interpret monitoring and research information in the Central and Eastern Eyre Peninsula. This information has also been used to identify and prioritise future actions which would benefit Malleefowl populations on the Eyre Peninsula.

Large areas of uncleared land exist on the Eyre Peninsula with many of the areas formally protected under various arrangements. Annual monitoring by regional Landscape Boards and the SA Department for Environment and Water has shown that Malleefowl are continuing to decline, even in conservation regions. Therefore, increasing the area of protected land is not seen as a priority at this time. Instead we believe that Malleefowl will benefit from broad scale active management of these areas. Actions to address key threatening processes (unsustainable herbivory from goats, kangaroos, rabbits; elevated predation by foxes and feral cats and elevated fire risk) are considered of higher importance.

We fully support the threat abatement management approach offset over 65,000 ha as outlined by Ecological Horizons (as opposed to a land based offset) and look forward to continuing our close relationship with them into the future.

Yours sincerely,

Jodie Gregg-Smith
General Manager
SA Arid Lands Landscape Board

Government of South Australia

National Parks and Wildlife Service SA
Eyre and Far West
PO Box 22, Pt Lincoln
SA 5606.

16 June, 2021

Thomas Smith
Post Approvals Section
Department of Agriculture, Water and the Environment
GPO Box 787
Canberra ACT 2601

Dear Mr Smith,

RE: Letter of support for Malleefowl management area offset for Eyre Peninsula Transmission Line

National Parks and Wildlife Service - Eyre and Far West give written support for the jointly proposed *Malleefowl management area offset plan* between Electranet and Ecological Horizons. The proposal aims to offset land disturbance activities associated with the construction of the new Eyre Peninsula Powerline though the delivery of active broadscale management and much needed conservation actions for Malleefowl within existing areas of native vegetation.

Our staff have been working in collaboration with Dr Katherine Moseby and Dr John Read through the Middleback Alliance partnership for close to a decade. The monitoring and research work that Ecological Horizons has amassed during this time is essential in our collective understanding of how threatened species are faring in central and eastern Eyre Peninsula. We acknowledge in this time Malleefowl have continuing to decline, as witnessed through annual monitoring by DEW and regional Landscapes Boards. Actions to address key threatening processes (such as unsustainable herbivory from goats, kangaroos, rabbits; elevated predation by foxes and feral cats and elevated fire risk) are of highest importance to us in this landscape at this time.

The proposed plan is underpinned by up-to-date monitoring and research findings. Evidence that has helped in identifying and prioritising future actions. Pointing the way forward to a mature and customised approach for greater conservation gains specific to this country. The proposal offers a befitting solution to known and current threats afflicting Malleefowl in the central and eastern Eyre Peninsula area, an area all parties agree already has with considerable expanses of uncleared land under different conservation arrangements. Therefore we support Ecological Horizons threat abatement management approach as an offset over 65,000 ha, as opposed to a land based offset.

If you wish to discuss this letter further please feel welcome to contact me on 0428 104 795.

Yours faithfully,

Tim Hall

National Parks and Wildlife Manager, Eyre and Far West

Dr Joe Benshemesh
National Malleefowl Recovery Group
E: joe@nationalmalleefowl.com.au
P: 0407191401

Thomas Smith
Post Approvals Section
Department of Agriculture, Water and the Environment
GPO Box 787
Canberra ACT 2601

4/6/2021

Dear Mr Smith,

Letter of endorsement for proposed Malleefowl offset strategy for the Electranet Eyre Peninsula Transmission Line

I write to you as the author of the current National Malleefowl Recovery Plan, member of the National Malleefowl Recovery Team, and chair of the National Malleefowl Recovery Group Inc., in support of the proposal by Drs Katherine Moseby and John Read (Ecological Horizons) and ElectraNet Pty Ltd to allocate offset funds to improved broadscale active management rather than further land acquisition.

For offsets to be effective in benefitting threatened species, they need to be considered in a local and national context. Large areas of relatively undisturbed habitat already exist on the Eyre Peninsula, and strong clearing controls in SA essentially protect areas of high conservation value. Nonetheless, malleefowl populations have declined dramatically across SA in on the Eyre Peninsula in particular, as outlined in a recent report titled 'Malleefowl Monitoring and Recovery Program 2020/21 Season' by the National Malleefowl Recovery Group to the Department of Agriculture, Water and the Environment (Biodiversity Conservation, Project Delivery). These declines have occurred across all land tenures, including National Parks and other reserves, and demonstrate that protecting habitat and applying basic land management is not sufficient to arrest this species decline.

The proposal by Ecological Horizons and ElectraNet to use offset funds to undertake broadscale active management to address key threatening processes within *existing* protected areas would likely provide greater benefits to malleefowl populations on Eyre Peninsula than simply arranging further habitat reservation. In particular, the works proposed will lead to improved knowledge of which management interventions work in benefitting malleefowl, and these lessons may then be applied elsewhere across Australia.

Drs Katherine Moseby and John Read have an exceptionally strong reputation in conservation ecology and are already partners in the National Malleefowl Monitoring Program, and the National Malleefowl Adaptive Management Predator Experiment. They are ideally suited to undertake the proposed works.

I have no doubt that offset funds would be better spent on improved broadscale management and research than a land-based offset. I have taken it upon myself to consult with the Chair of the National Malleefowl Recovery Team (Ross Macfarlane) and, while he is unable to speak for all team members, he wanted me to convey his personal endorsement for the Malleefowl offset strategy

proposed by Ecological Horizons and ElectaNet and has offered to take the matter to the recovery team if required.

Sincerely

LANDSCAPE SOUTH AUSTRALIA EYRE PENINSULA

Eyre Peninsula Landscape Board

86 Tasman Terrace
Port Lincoln SA 5606
PO Box 2916

Tel 08 8688 3200

ep.landscapeboard@sa.gov.au
landscape.sa.gov.au/ep/

Ref: EPLB-D000012

7th June 2021

Department of Agriculture, Water & the Environment
Mr. Thomas Smith
GPO Box 787
Canberra ACT 2601

Dear Thomas,

RE: Letter of support for Malleefowl management area offset for Eyre Peninsula Transmission Line

We would like to put forward this letter of support for Electranet and Ecological Horizons, and their joint proposed Malleefowl management area offset plan. The plan aims to offset land disturbance activities associated with the construction of the new Eyre Peninsula Powerline.

We have been collaborating with Dr Katherine Moseby and Dr John Read for a number of years, to collect and interpret monitoring and research information in the Central and Eastern Eyre Peninsula. This information has also been used to identify and prioritise future actions which would benefit Malleefowl populations on the Eyre Peninsula.
Large areas of uncleared land exist on the Eyre Peninsula with many of the areas formally protected under various arrangements. Annual monitoring by DEW and regional Landscapes Boards has shown that Malleefowl are continuing to decline, even in conservation regions. Therefore, increasing the area of protected land is not seen as a priority at this time. Instead we believe that Malleefowl will benefit from broad scale active management of these areas. Actions to address key threatening processes (unsustainable herbivory from goats, kangaroos, rabbits; elevated predation by foxes and feral cats and elevated fire risk) are considered of higher importance.

To confirm, we support the threat abatement management approach offset over 65,000 ha as outlined by Ecological Horizons (as opposed to a land based offset).

If you wish to discuss this letter of endorsement then please don't hesitate to contact me at Jonathan.Clark2@sa.gov.au or 0429 676 870.

Yours sincerely

JONATHAN CLARK
General Manager

15. APPENDIX B – Habitat Quality Scoring for Malleefowl for the Eyre Peninsula Transmission Line

Habitat Scoring System for Malleefowl (DAWE)*

Indicator	Score	Detail	Scores			
		Site Condition	**Impact site**	**OS Start**	**W/o OS**	**With OS**
Vegetation condition and structure. Diversity of habitat species present. Habitat features	3	**Keighery**: Pristine or Excellent. **Habitat quality**: Very High - Sandy substrate with leaf litter, intact habitat structure (groundcover, mid-storey, trees for roosting), no habitat damage by herbivores, no fire for at least 20 years, currently active mounds				
	2.5	**Keighery:** Very Good. **Habitat quality**: High - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), foraging available (seeds, insects), little evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 15 years, mounds active within last 12 months				**2.5**
	2	**Keighery**: Good. **Habitat quality**: Medium - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), some evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 10 years, mounds active within the last 3 years	**2**	**2**		
	1.5	**Keighery:** Poor. **Habitat quality**: Low – little leaf litter, some gaps in habitat structure (groundcover, mid-storey, trees for roosting), evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), fire within last 10 years, no active mounds within last 5 years			**1.5**	
	1.0	**Keighery**: Very poor**. Habitat quality**: Very Low - little leaf litter, large gaps in habitat structure (groundcover, mid-storey, trees for roosting), considerable habitat damage by herbivores (e.g. rabbits, goats, stock), fire within last 5 years, no active mounds within last 7 years				
	0.5	**Keighery**: Degraded **Habitat quality**: Marginal - no leaf litter, missing habitat structure (groundcover, mid-storey and trees for roosting), severe habitat damage by herbivores (e.g. rabbits, goats, stock), fire within last 5 years, no active mounds within last 10 years				
	0	**Keighery:** Completely degraded **Habitat quality**: Absent, no vegetation and/or suitable habitat on site - no leaf litter, no habitat structure, no signs of mounds				
		Site Context	**Impact site**	**OS Start**	**W/o OS**	**With OS**
Movement patterns of the species. Proximity of the site in relation to other areas of suitable habitat. Overall population or extent of a species.	3	Site is connected by vegetation to more than one area of contiguous suitable habitat. Records on the site for species within last 12 months; site is within known distribution of species.				
	2.5	Site is connected by vegetation to at least one area of contiguous suitable habitat. Records on site for species within last 2 years. Site is within known distribution of species.	2.5	2.5	2.5	2.5
	2	Site is connected by vegetation to more than one patch of suitable habitat. Records on site or adjacent (within 2 km) to site within last 3 years. Site is within known distribution of species.				
	1.5	Site is connected by vegetation to at least one patch of suitable habitat. Records on or adjacent (within 5 km) to site within last 5 years. Site is located within known distribution of species.				
	1	Site is separated from other known suitable habitat by cleared areas of up to 5 km. Records on site or adjacent (within 5 km) within last 10 years and species are capable of migrating to site. Site is located within known distribution of species.				
	0.5	Site is separated from other suitable habitat by cleared areas of up to 10 km. Records on site or in region (within 10 km) within last 10 years and species may be capable of migrating to site. Site is not located within known distribution of species.				
	0	Site is separated from other suitable habitat by cleared areas of more than 10 km. No records on site or in region (within 10 km) within last 10 years and species unlikely to migrate to site.				
Indicator	**Score**	**Detail**	**Scores**			

Species Stocking Rate			Impact site	OS Start	W/o OS	With OS
Usage and/or density of a species. Role of the site population in regard to overall species population viability.	4	Record of species presence on site in last 12 months (birds observed on site in last 12 months; evidence of currently active mounds); site is adjacent to verified/published records in last 12 months				4
	3	Record of species presence on site in last 2 years (birds observed on site in last 2 years; evidence of mounds active in last 2 years); site is within 2-5 km of verified/published records up to 2 years	3	3		
	2	Record of species presence on site in last 3 years (birds observed on site in last 3 years; evidence of mounds active in last 3 years); site is within 5 km of verified/published records up to 3 years			2	
	1	Record of species presence on site in previous 5 years (Birds observed on site in last 5 years; evidence of mounds active in last 5 years); site is within 5 km of verified/published records up to 5 years (minimum required to be considered a suitable offset site for Malleefowl)				
	0	No record of species presence on site, or within 5 km in last 5 years (5 km is estimated home range for Malleefowl)				

*This habitat scoring system describes elements indicative of suitable habitat for Malleefowl. It does not replace robust and appropriate survey information (i.e. mound surveys, species presence, vegetation condition), which must be provided to support proposed offsets. Surveys must be undertaken by suitably experienced experts.

15.1. Additional Information to Support the Habitat Quality Scoring for Malleefowl

An assessment has been undertaken, utilising a number of information sources, to complete the Habitat Quality Scoring for Malleefowl. Scores have been allocated for each of the detail categories for the impact area, the Offset Area at the commencement of the offset, the Offset Area if the offset was not in place and the Offset Area with the offset in place. Additional information has been presented in Table 15.

Table 14: Information to support the Habitat Quality Scoring for Malleefowl

	Rating	Supporting Information
Site Condition		
Impact Site	2	***Keighery**: Good. **Habitat quality**: Medium - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), some evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 10 years, mounds active within the last 3 years* Areas which have not been burnt mainly consist of sandy substrate and leaf litter. While structural complexity of vegetation is evident, kangaroos and goats are present in the area and have a grazing impact on vegetation. Grazing pressure is demonstrated by detection rate of kangaroos and goats within the Secret Rocks Nature Reserve. Data have been collected from 14 long term cameras set within the Reserve. Kangaroos, goats, cats and foxes have been recorded regularly with detection rates shown in Table 16. Plate 11 shows a fox, while Plate 12 shows an image of a goat, both detected on remote cameras in the Secret Rocks Nature Reserve. Approximately 50% of the impact site was burnt in a bushfire in January 2020. Given this, we have rated the impact site between "no fire for at least 20 years" (rating of 3) and "fire within last 5 years (rating of 1)". Refer to Figure 7 for a map showing the footprint of the 2020 bushfires. There are many mounds in close proximity to the impact site, the closest being less than 100 m. The majority of the mounds were not found to be active in 2019 and 2020, however at least eight nests within 500 m of the impact zone were found to have had some activity (ie scratchings or Malleefowl tracks) in 2019 and 2020. Refer to Figure 7 for data related to longer term Malleefowl activity and Figure 8 for 2019-2020 monitoring data.
Offset Start	2	*Keighery: Good. Habitat quality: Medium - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), some evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 10 years, mounds active within the last 3 years*

	Rating	Supporting Information
		Sandy substrate and leaf litter occurs throughout the Offset Area. While structural complexity of vegetation is evident, kangaroos and goats are present in the area and have a grazing impact on vegetation. Grazing pressure is demonstrated by detection rate of kangaroos and goats within the Secret Rocks Nature Reserve area. Data have been collected from 14 long term cameras set within the Reserve. Kangaroos, goats, cats and foxes have been recorded regularly with detection rates shown in Table 16. Plate 11 shows a fox while Plate 12 shows an image of a goat, both detected on remote cameras in the Secret Rocks Nature Reserve. Two bushfires took place in December 2019/January 2020 within the Secret Rocks area, however neither of the bushfires impacted the Offset Area. Refer to Figure 7 for a map showing the footprint of the 2019/2020 bushfires. Malleefowl mounds are evident within the Offset Area. All of these nests were found to be not active during surveys in 2019 and 2020. There were four nests within the Management Area that were found to show Malleefowl activity (scratchings and tracks) during the 2019 and 2020 survey. Refer to Figure 7 and Figure 8 for data related to Malleefowl activity. Given the activity of Malleefowl mounds and presence of herbivores, the overall rating for the site was 2.
Without Offset	1.5	***Keighery:*** *Poor.* ***Habitat quality****: Low – little leaf litter, some gaps in habitat structure (groundcover, mid-storey, trees for roosting), evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), fire within last 10 years, no active mounds within last 5 years* Without the offset in place, and without control of herbivores, it is expected that leaf litter and vegetation complexity and condition will decrease. Reduced food availability for Malleefowl will result in a decrease in nesting activity. Given this the overall rating of the site has been reduced to 1.5. Refer to Figure 7 and Figure 8 for data related to Malleefowl activity.
With Offset	2.5	***Keighery:*** *Very Good.* ***Habitat quality****: High - Sandy substrate with leaf litter, largely intact habitat structure (groundcover, mid-storey, trees for roosting), foraging available (seeds, insects), little evidence of habitat damage by herbivores (e.g. rabbits, goats, stock), no fire for at least 15 years, mounds active within last 12 months* Provision of the offset, including control of herbivores and predators, will result in greater leaf litter, greater food availability for Malleefowl and a greater proportion of active mounds. As a result, it is expected that the rating for the Offset Area will increase to 2.5.
Site Context		

	Rating	Supporting Information
Impact Site	2.5	*Site is connected by vegetation to at least one area of contiguous suitable habitat. Records on site for species within last 2 years. Site is within known distribution of species.* The impact site is connected to extensive areas of contiguous suitable habitat and is shown in Figure 8. The impact site is within the known distribution of Malleefowl (refer to Figure 9). A radiotagged Malleefowl frequently traversed the Project Area in 2020 (unpublished data, Stenhouse and Moseby) (Figure 10). Several Malleefowl were observed along the existing transmission line in 2012-2013 (pers. com. K Moseby). There is an unofficial sighting of Malleefowl in the impact site for August 2021. Known nesting sites also occur within 100 m from the impact site. Refer to Figure 7 and Figure 8 for data related to Malleefowl activity and sightings. Therefore, the rating for the impact site is 2.5.
Offset Start	2.5	*Site is connected by vegetation to at least one area of contiguous suitable habitat. Records on site for species within last 2 years. Site is within known distribution of species.* The offset site is connected to extensive areas of contiguous suitable habitat and is shown in Figure 8. The offset site is within the known distribution of Malleefowl (refer to Figure 10). Malleefowl have been recorded within the Offset Area within the past 2 years. Refer to Figure 7 and Figure 8 for data related to Malleefowl activity and sightings. Therefore, the rating for the impact site is 2.5.
Without Offset	2.5	*Site is connected by vegetation to at least one area of contiguous suitable habitat. Records on site for species within last 2 years. Site is within known distribution of species.* The impact site is connected to extensive areas of contiguous suitable habitat and is shown in Figure 9. Without the offset in place the area will remain connected to areas of contiguous vegetation, therefore no change is predicted. There may be a reduction in Malleefowl abundance and nesting activity, however it is likely that there will still be records on site for the species within 2 years Therefore, the rating for the Offset Area without the offset being in place remains at 2.5.
With Offset	2.5	*Site is connected by vegetation to at least one area of contiguous suitable habitat. Records on site for species within last 2 years. Site is within known distribution of species.* The impact site is connected to extensive areas of contiguous suitable habitat and is shown in in Figure 9. Without the offset in place the area will remain connected to areas of contiguous vegetation, therefore no change is predicted. There

	Rating	Supporting Information
		may be an increase in Malleefowl abundance and nesting activity, however it is unlikely that this will change the rating. Therefore, the rating for the Offset Area with the offset being in place remains at 2.5.
Species Stocking Rate		
Impact Site	3	*Record of species presence on site in last 2 years (birds observed on site in last 2 years; evidence of mounds active in last 2 years); site is within 2-5 km of verified/published records up to 2 years* A radiotagged Malleefowl frequently traversed the Project Area in 2020 (unpublished data, Stenhouse and Moseby) **(**Figure 11). Several Malleefowl were observed along the existing transmission line in 2012-2013 and on camera on transmission line gate in 2015 (pers. com. K Moseby). There is an unofficial sighting of Malleefowl in the impact site for August 2021**.** Known nesting sites also occur within 100 m from the impact site. Refer to Figure 7 and Figure 8 for data related to Malleefowl activity and sightings.
Offset Start	3	*Record of species presence on site in last 2 years (birds observed on site in last 2 years; evidence of mounds active in last 2 years); site is within 2-5 km of verified/published records up to 2 years* Malleefowl have been recorded within the Offset Area within the past 2 years. The last recorded activity on mounds in the management area was in 2019 and 2020. Refer to Figure 7 and Figure 8 for data related to Malleefowl activity and sightings.
Without Offset	2	*Record of species presence on site in last 3 years (birds observed on site in last 3 years; evidence of mounds active in last 3 years); site is within 5 km of verified/published records up to 3 years* Without the offset being in place is it expected that the sightings and nesting activity of Malleefowl will decrease, resulting in fewer sightings over years and greater distance from nesting sites. As a result, the rating for the Offset Area without the offset in place is expected to reduce to 2.
With Offset	4	*Record of species presence on site in last 12 months (birds observed on site in last 12 months; evidence of currently active mounds); site is adjacent to verified/published records in last 12 months* With the offset in place is it expected that the sightings and nesting activity of Malleefowl will increase, resulting in greater sightings over years and an increase in nesting activity at known nesting sites. As a result, the rating for the Offset Area with the offset in place is expected to increase to 4.

Table 15: Detection rates of kangaroos, goats, cats and foxes taken from remote cameras

Animal	Detection Rate (detections per 100 trap nights)	
	Maximum	Average
Kangaroo	201.63	40.07
Goat	35.65	8.06
Animal	**Detection Rate (%)**	
	Maximum	Average
Cat	6.53	2.30
Fox	22.08	6.18

Note: figures represent the average camera detection rates on 10 cameras (total number of detections divided by total number of trap nights x total number of cameras).

Plate 11: Fox captured on a remote camera within the Secret Rocks Nature Reserve (within 5 km of the Management Area)

Plate 12: Goat detected on a remote camera within the Secret Rocks Nature Reserve (within 1 km of the Management Area)

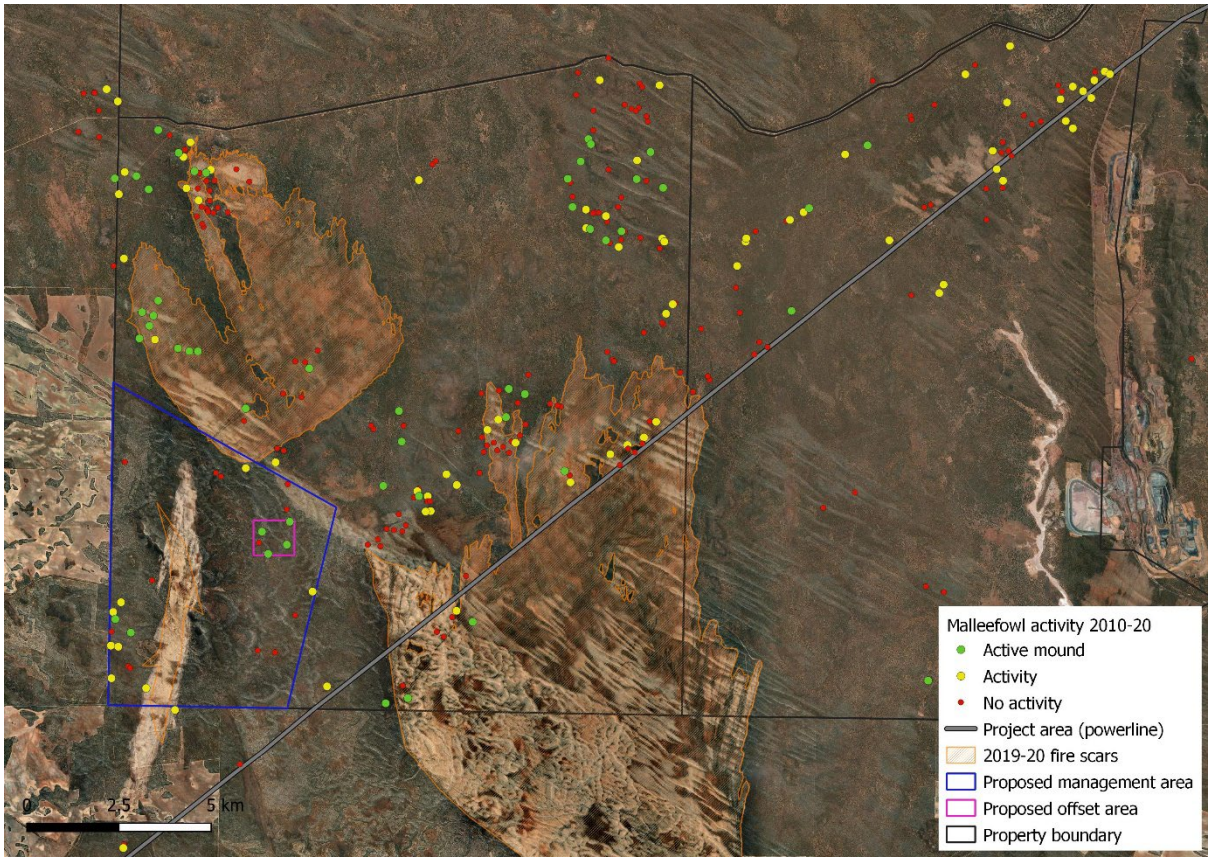

Figure 7: Disturbance area, Offset Area showing recent bushfire areas and Malleefowl activity for 2010-2020

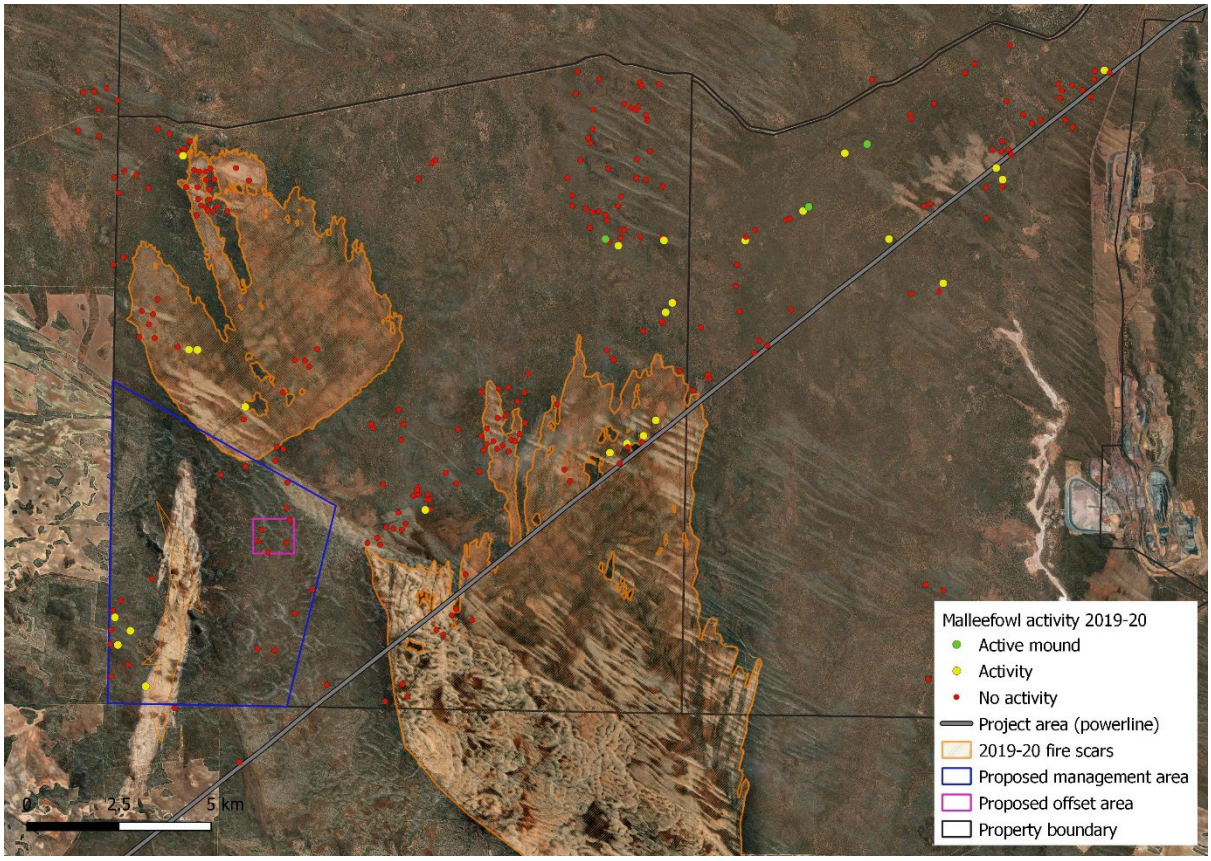

Figure 8: Disturbance area, Offset Area showing recent bushfire areas and Malleefowl activity for 2019-2020

Note: (sourced from https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx on 10/06/2021)

Figure 9: Areas of remnant vegetation (pale green) on the Eyre Peninsula (blue star shows location of Offset Area)

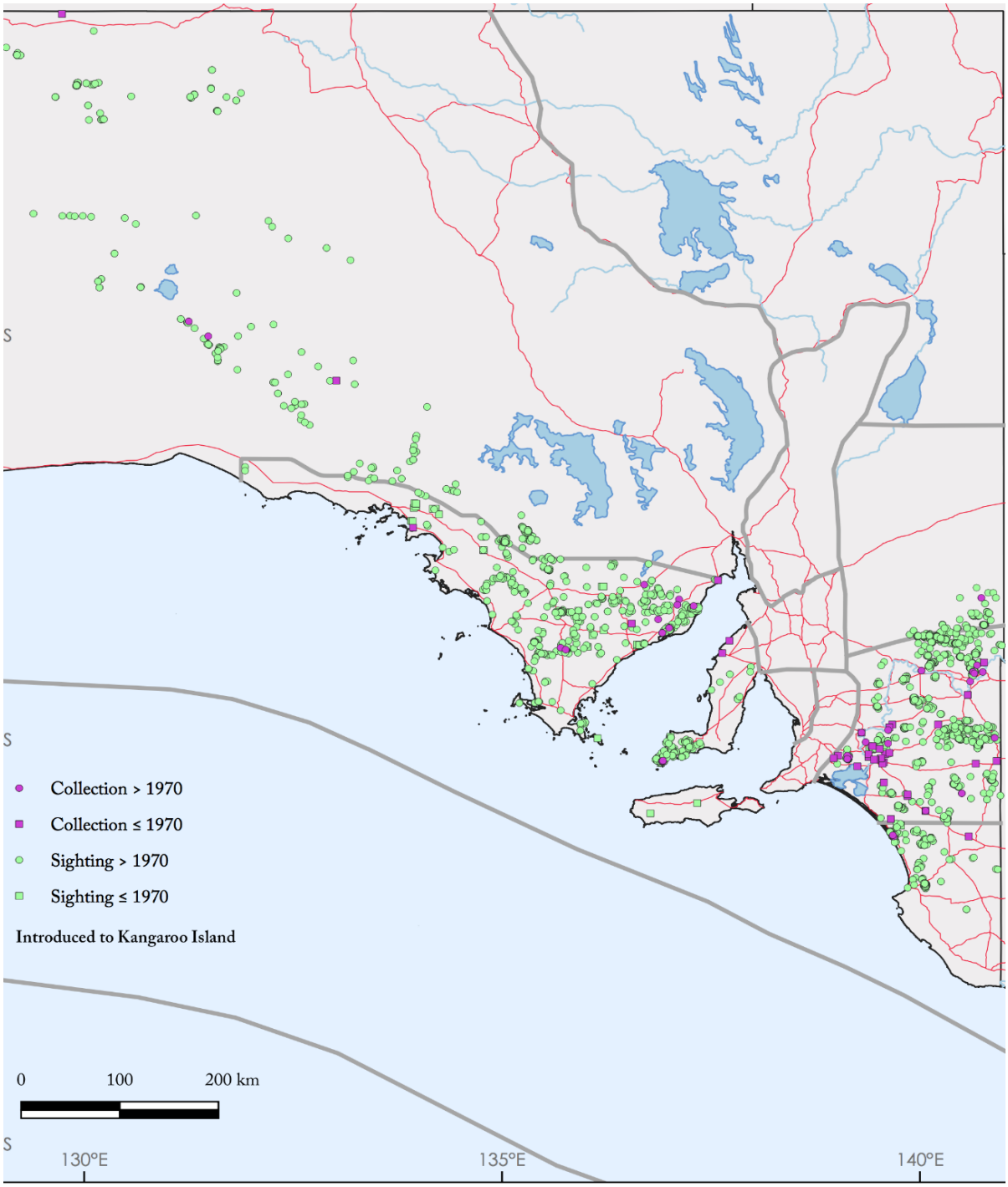

Figure 10: Distribution of Malleefowl across the EP/SA (Birds SA 2020)

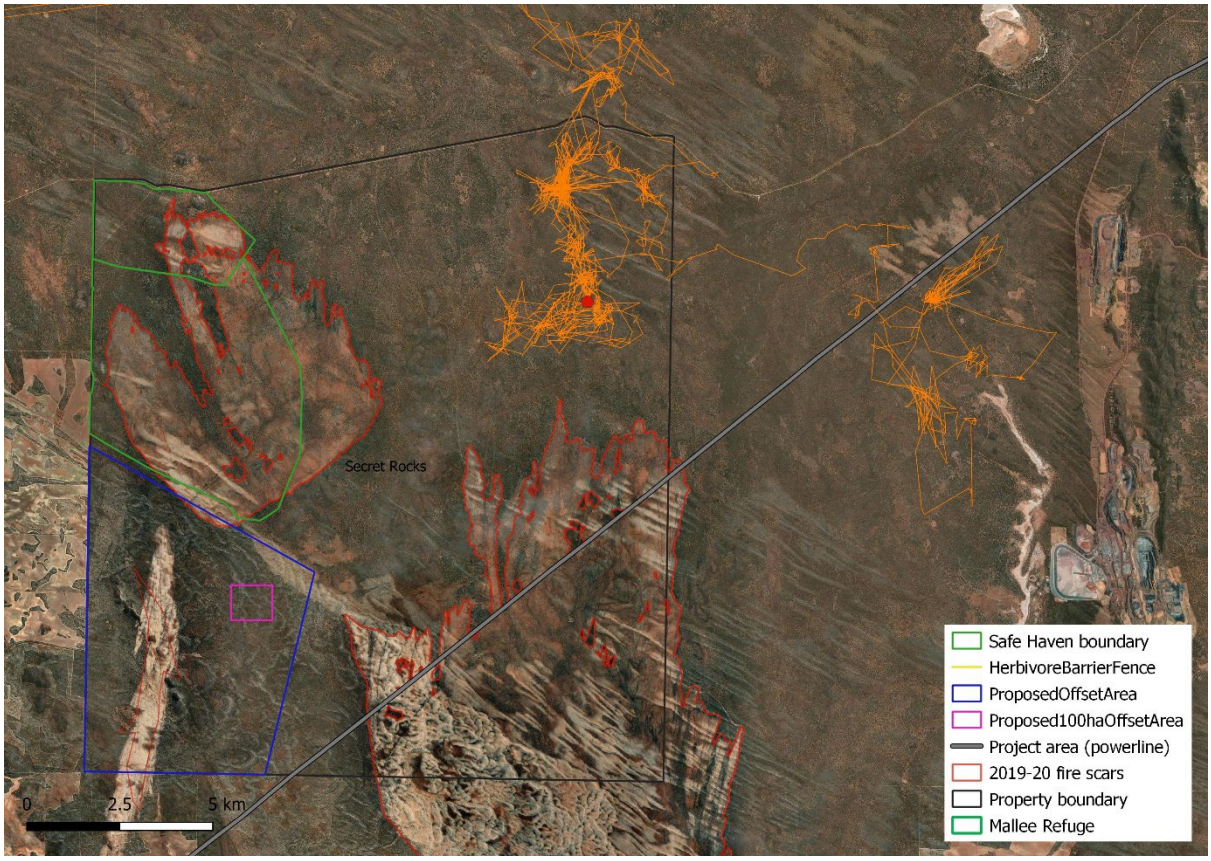

Figure 11: Map showing radiotracked Malleefowl traversing the Powerline (powerline is straight line through the centre of the map and orange cluster of lines in northeast corner shows tracking record of the Malleefowl)