OFFSET AREA MANAGEMENT PLAN

VULCAN COMPLEX PROJECT

Tenure number: ML700060

November 2021

Prepared for:	Department of Agriculture, Water and the Environment
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ACKNOWLEDGEMENTS AND DISCLAIMER

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DECLARATION OF ACCURACY

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: _____

Full name: Michael Callan, Chief Operating Officer

Organisation: Vitrinite Pty Ltd

Date: 24/11/2021

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1 Executive Summary

The Vulcan Complex Project (**VCP**) is a small-scale coal mine operated by Vitrinite Pty Ltd between Dysart and Moranbah, within mining lease ML 700060. Environmental assessments undertaken as part of the approval process identified a potential for the VCP to cause the loss of 203.5 ha of habitat for the Koala (*Phascolarctos cinereus*) with a habitat quality score of 4.4/10, and 170.0 ha of breeding habitat and 209.8 ha of foraging habitat for the Squatter Pigeon (*Geophaps scripta scripta*) with a habitat quality score of 6.3/10. Note that breeding and foraging habitat for the Squatter Pigeon overlap, such that only 39.8 ha of foraging habitat that will be removed is not also breeding habitat. Both the Koala and Squatter Pigeon are listed as vulnerable species under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**), making them matters of national environmental significance.

The VCP was referred to the Department of Agriculture, Water and the Environment (**DAWE**) for assessment under the EPBC Act (referral number EPBC 2020/8676). The VCP was deemed a controlled action that necessitated environmental offsets given that residual impacts to MNES could not be avoided.

Vitrinite Pty Ltd proposes to compensate for impacts to the Koala and Squatter Pigeon through 100% direct offsets located within the same local government area as the impact. These offsets will achieve gains for the Koala and Squatter Pigeon within a 738.7-ha offset area located on "Ellensfield" (Lot 13 SP178466). These gains will be achieved by reducing the threats of clearing, feral predators and weeds, and through improving the condition of habitat via active management measures such as the installation of supplementary water sources and rotational grazing.

This Offset Area Management Plan (**OAMP**) has been prepared to demonstrate how the selected offset area addresses the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (**EOP**) (DSEWPaC 2012a). The plan utilises the findings of the ecological assessments from both the impact site and offset area to outline how the offset obligations and requirements under the EOP are addressed. This OAMP also provides further details regarding the management of offsets to meet the requirements of DAWE's request for additional information issued on 14 July 2020. The OAMP also describes the monitoring and reporting that are to take place.

Once approved by the Australian Government, the offset area must be managed in accordance with this OAMP.

PART A: PROJECT BACKGROUND AND SITE DESCRIPTION

2 Introduction

2.1 Project Description

The Vulcan Complex Project (**VCP**) is a small open-cut coal-mining operation that is proposed to be developed by Vitrinite Pty Ltd between Dysart and Moranbah, in the Bowen Basin of Queensland. It is located on Lot 10SP208611 and in the area covered by ML 700060.

The VCP lies within the Northern Bowen Basin subregion (less than 1 km from its boundary with the Isaac-Comet Downs subregion) of the Brigalow Belt Bioregion. The Project falls within the local government area of the Isaac Regional Council. It lies adjacent to Saraji Road, 33 km south- south-east of Moranbah and 34 km north-north-west of Dysart. The tenure of the land is leasehold.

ML 700060 covers an area of approximately 408 hectares (**ha**). The proposed disturbance footprint is 235.7 ha in extent, and comprises 1.7% remnant vegetation, 32.0% high-value regrowth and 66.2% non-remnant habitat.

Ecological assessments undertaken as part of the approval process (METServe 2020) identified two matters of national environmental significance (**MNES**) that will potentially experience significant residual impacts from the project. Due to these impacts, the VCP was referred to the Department of Agriculture, Water and the Environment (**DAWE**) (referral number EPBC 2020/8676) for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**). It was determined that the project is a controlled action that is to be assessed further via preliminary documentation. The preliminary documentation that has been prepared has confirmed that residual impacts of the VCP are likely for two listed threatened species, the Koala (*Phascolarctos cinereus*) and Squatter Pigeon (*Geophaps scripta scripta*). Environmental offsets are proposed to ensure the project does not result in a net loss to either of these matters.

To achieve these environmental offsets, Vitrinite Pty Ltd intends to restore areas of land that support the matters that will be impacted by the Vulcan Complex Project. The approach taken to identify a suitable offset area is detailed within the VCP Environmental Offsets Strategy, which accompanied the preliminary documentation submitted to DAWE on 24 June 2021. An offset area has since been identified.

This Offset Area Management Plan (**OAMP**) has been prepared to demonstrate how the selected offset area addresses the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (**EOP**) (DSEWPaC 2012a). The plan utilises the findings of the ecological assessments from both the impact site and offset area to outline how the offset obligations and requirements under the EOP are addressed. This OAMP also provides further details regarding the management of offsets to meet the requirements of DAWE's Request for additional information issued on 14 July 2020.

2.2 Purpose

The purpose of the OAMP is to deliver the information required in DAWE's request for additional information of 14 July 2020. The information requirements are listed in **Table 1**, with references to the relevant section of the OAMP also provided.

Table 1 EPBC 2020/8676 additional information requirements

Information request	OAMP section or comment
Details to demonstrate how the environmental offset/s compensates for residual significant impacts of the project on relevant listed threatened species and communities, and/or their habitat, in accordance with the principles of the EOP and all requirements of the Offsets Assessment Guide.	Refer to **Section 3.1** and **Schedule 2**
A description of the environmental offset/s, including location, size, condition, environmental values present and surrounding land uses.	Refer to **Section 5**
Baseline data, including from field validation surveys, and other supporting evidence that documents the presence of the relevant listed threatened species and communities, and the quality of their habitat, within the environmental offset area/s.	Refer to **Sections 5.5, 5.6** and **5.7**, and **Schedule 3**
An assessment of the site habitat quality for the environmental offset/s using the *Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets* under the Queensland Environmental Offsets Policy (Version 1.2, April 2017), or subsequent published revision.	Refer to **Section 5.7**
Details of how the environmental offset/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant listed threatened species and communities.	Refer to **Section 5.2**
Maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the listed threatened species and communities that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares).	A shapefile of the offset area will accompany the submission of the draft OAMP.
Specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the environmental offset/s over an appropriate period.	Refer to **Section 6**
Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria.	Refer to **Section 9**
Interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria.	Refer to **Section 6**
Details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the environmental offset/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions).	Refer to **Section 12**
Proposed timing for the completion of internal monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved	Refer to **Section 12.2.3**
Timing for the implementation of corrective actions if monitoring activities indicate the interim milestones have not been achieved.	Refer to **Section 12.3**
Risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix.	Refer to **Section 8**
Evidence of how the management actions and corrective actions take into account relevant approved conservation advices and are consistent with relevant recovery plans and threat abatement plans.	Refer to **Section 3.2**
Details of the legal mechanism for legally securing the environmental offset/s, such	Refer to **Section 11**

Information request	OAMP section or comment
that legal security remains in force over the environmental offset/s for at least 20 years to provide enduring protection for the environmental offset/s against development incompatible with conservation	
The draft Offset Management Strategy and draft OAMP must be prepared by a suitably qualified ecologist and in accordance with the Department's *Environmental Management Plan Guidelines* (Department of the Environment 2014).	The OAMP has been written to accord with the guidelines.

The OAMP has the following principal objectives:

1. To describe the baseline conditions at the offset area;
2. To describe the management of the offset area;
3. To describe the expected gains that will be achieved at the offset area for the Koala and Squatter Pigeon;
4. To consider the potential risks of failing to achieve the above gains;
5. To demonstrate how the environmental offset compensates for residual significant impacts of the VCP on relevant listed threatened species; and
6. To describe the monitoring program and completion criteria that determine whether the offset has been successful.

2.3 Offset Area

The proponent has surveyed a property large enough to acquit the potential offset requirements associated with the VCP project. Based on the starting habitat quality scores and potential for improvement, an area has been selected that meets the requirements of the EOP. The area known as the Ellensfield VCP Offset Area (the **offset area**), is the subject of this OAMP.

The selected property is consistent with the EOP's principles. Consideration was also given to future property planning and any potential future use for the property to avoid the potential for conflicting future land use pressures at the offset area.

The property has existing environmental offsets located on it for other projects by other proponents. Locating the offsets for this project on this property will improve the biodiversity value of each individual offset, and strengthen other values such as connectivity and resilience. Management efficiencies for each offset will be achieved where the management actions, reporting timeframes and monitoring, can be aligned, where appropriate. This will achieve efficiencies in managing many aspects of the cumulative offset area, such as management of weeds, feral animals, fire, and monitoring.

2.4 Plan Structure

The OAMP is divided into 2 parts – **Part A** (Project Background and Site Description) and **Part B** (Offset Land Management).

Part A contains:

- Introduction to the VCP Project and the purpose of the plan;
- How the offsets address the EOP and EPBC Plans;
- An overview of the proposed offset property;
- Impact area description;
- Offset property information, including the landscape values; and
- Offset area description and habitat quality scores.

Part B contains the Land Management plan, containing:

- Risk analysis;

- Offset management measures;
- Completion criteria and performance targets; and
- Monitoring and reporting.

3 EPBC Act Environmental Offsets Policy and framework

This section describes how the proposed offset meets the relevant requirements of the *EPBC Act Environmental Offsets Policy* (October 2012) (**EOP**), plans and guidelines.

3.1 Policy Principles

The EOP sets out eight key overarching principles to determine the suitability of offsets. **Table 2** outlines each of the policy principles and how it has been considered in the OAMP, with a reference to the relevant OAMP section.

Table 2 Accordance with the EPBC Act Environmental Offsets Policy

Policy principle	How this will be achieved
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matters.	• By proposing an offset area and management strategy that, when assessed using the Offset Assessment Guide, indicates No Net Loss or a Net Gain for the Koala and Squatter Pigeon; • By achieving a positive conservation outcome for the same protected matters as being impacted (i.e., the Koala and Squatter Pigeon) and the same attributes (i.e., both foraging and breeding habitat for the Squatter Pigeon will be assessed separately); • By providing evidence that the Koala and Squatter Pigeon are in the offset area; • By implementing the offset for the duration of the impact (anticipated 20 years), not just the action itself (4 years); • By restoring native vegetation communities and ecosystems, rather than non-native ones; and • By committing to a future habitat quality that is equal to, or greater than, the quality of the impact site, and which is to be attained by the nominated time until ecological benefit and then maintained for the duration of the approval.
Suitable offsets must be built around direct offsets but may include other compensatory measures.	• By having 100% of the Project's MNES offset obligations delivered through direct land-based offsets.
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	• By considering the level of statutory protection (vulnerable, endangered or critically endangered) for the Koala and Squatter Pigeon when applying the Offset Assessment Guide. Both matters are listed as vulnerable.
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	• By using the attributes of the protected matters being impacted, the quality and importance of those attributes, the nature of the impact (e.g. permanent or temporary), the level of threat applicable to the offset area, the time it will take to achieve a conservation gain for the protected matter, and risk of the conservation gain not being realised when informing the inputs into the Offset Assessment Guide; and • By ensuring that offsets calculations are as accurate as possible and implementing the Precautionary Principle where there is scientific uncertainty.
Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	• By using direct offsets instead of other compensatory measures; • By including a risk analysis within **Section 8** of this OAMP, which considers factors that could affect the success of the offset (i.e. attain the completion criteria by the nominated time until ecological benefit and maintain this for

Policy principle	How this will be achieved
	the duration of the approval); • By proposing measures within the OAMP for if the offset fails (**Section 9.2**); • By detailing within the OAMP how and when the Precautionary Principle has been applied; and • By including uncertainty in the Offset Assessment Guide.
Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs.	• By providing conservation gains that are in addition to duty of care or environmental planning laws; • By calculating the risk of loss based on existing environmental planning laws (e.g., *Vegetation Management Act 1999*) that apply to the offset area (**Section 5.3** of this OAMP); and • By delivering conservation gains that have not been paid for, or achieved, while participating in other schemes (e.g., carbon offset scheme).
Suitable offsets must be efficient, timely, transparent, scientifically robust and reasonable	• By implementing offsets prior to the commencement of the VCP; • By having a habitat quality scoring system that is based on scientifically robust and verifiable information, including published peer-reviewed studies, the Australian Government's Species Profile and Threats Database, expert opinion, and field-collected data from the local area (see the VCP Environmental Offsets Strategy for a detailed justification of this scoring system); • By implementing the Precautionary Principle if there is not scientific certainty; • By using scientifically robust and peer-reviewed methods for monitoring the progress of offsets; and • By having realistic offset commitments and completion criteria that are likely to be achieved despite any reasonable threats or risks.
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	• By detailing responsibilities for the offset area within **Section 9** of this OAMP; • By committing to measure and monitor the performance of the offset, and reporting on this every five years to the Department (**Section 12**); • By delivering the offset through contractual arrangements with a third party (a local landholder); and • By ensuring that offset commitments are measurable and specific so that they can be audited and enforced.

3.2 Relevance to EPBC Plans and Advice

The EOP states that an offset should address key priority actions for the impacted MNES in any approved recovery plans, threat abatement plans, conservation advice, ecological character description or approved Commonwealth Management Plan. **Table 3** summarises how this plan addresses the relevant Conservation Advices and Threat Abatement Plans.

Table 3 Conservation advice and threat abatement plans addressed in the OAMP

Document	Priority Actions	Implementation
Approved Conservation Advice for Phascolarctos cinereus *(Koala)* (DSEWPaC (2012b)	Threat abatement actions identified by the advice include: ▪ Development plans should explicitly address ways to mitigate risk of vehicle strike when development occurs adjacent to, or within, Koala habitat; ▪ Develop and implement a management plan to control the adverse impacts of predation on Koalas by dogs in urban, peri-urban and rural environments; ▪ Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them, if necessary; ▪ Develop and implement options of vegetation recovery and re-connection in regions containing fragmented Koala populations; ▪ Investigate formal conservation arrangement, management agreements and covenants on private land; ▪ Engage with private landholders and land managers responsible for the land on which populations occur and encourage these stakeholders to contribute to the implementation of conservation management actions; and ▪ Manage any other known, potential or emerging threats such a Bell Miner (*Manorina melanophrys*) Associated Dieback or *Eucalyptus* rust.	The offset includes management measures specifically aimed to control dogs and improve vegetation recover and connectivity. Public access to the offset area will be prohibited, limiting vehicular traffic to the site. Monitoring will investigate the effectiveness of the management measures implemented every five years. The offset will occur on private land, which will be subject to a voluntary declaration to protect vegetation from future clearing. Private landholders owning the land will be responsible for the implementation of conservation management measures. The offset area is located away from the distribution of Bell Miners, and the dry climate lessens the potential impact of Myrtle Rust.
National Koala Conservation and Management Strategy (NRMMC 2009)	Key objectives of the strategy are that: ▪ the Koala remains nationally abundant and widespread, and is not nationally threatened; ▪ the threatened statuses of the Koala at state and regional levels are reduced; ▪ Koalas in identified priority areas are stabilised or increasing; ▪ increased consideration of Koala habitat is demonstrated in development planning; ▪ productive and integrated partnerships that foster the conservation and welfare of Koalas;	By locating the offset site in the same local government area as the impact, the status of the species within the local region is not expected to change as a result of the project. By entering into an agreement with a local landholder, the total extent and connectivity of high-quality Koala habitat will be increased. This partnership with a local landholder to deliver the offsets, the offset also improves community participation in Koala conservation.

Document	Priority Actions	Implementation
	▪ greater areas of high-quality Koala habitat are conserved and effectively managed through legislation, covenants or agreements; ▪ greater activity by land and resource managers to effectively protect and manage Koala populations is facilitated by state and local governments; ▪ community capacity to drive Koala conservation and care is increased; and ▪ overabundant Koala groups are stabilised or reducing wherever they occur or arise.	
Draft National Recovery Plan for the Koala Phascolarctos cinereus *(combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE 2021a)	This draft recovery plan identifies the following as priority actions: ▪ To build and share knowledge through identifying nationally important populations and habitat, identifying priority areas for restoration, prioritising the implementation of actions and research, establishing a national Koala monitoring program, reviewing and coordinating mapping across jurisdictions, standardizing monitoring methods, and sharing knowledge and data about Koala conservation; ▪ To encourage strong community engagement with Koala conservation and monitoring; ▪ To strengthen cross-cultural knowledge exchange between indigenous and non-indigenous communities; ▪ To develop a user-friendly single-site portal for the general public to report Koala sightings; ▪ To develop national guidelines for veterinary standards of care; ▪ To increase the overall area of protected Koala habitat within the state protected areas; ▪ To expand existing targeted private land incentive mechanisms for habitat protection; ▪ To improve the condition of existing Koala habitat on both private and public land through altered land management practices, including management of vegetation, fire, weed and introduced species; ▪ To review and update referral guidelines, statutory planning instruments and policies to minimise impacts to the Koala; ▪ To ensure identification and implementation of any offset decisions are strategic, coordinated, tracked in governments' databases and informed by the recovery plan; ▪ To incorporate impacts of climate change into strategic Koala planning and actions; ▪ To develop and implement best-practice revegetation and restoration guidelines appropriate to local conditions;	The OAMP aligns with the draft recovery plan's priority actions by: ▪ Engaging local landholders to deliver the offset management; ▪ Increasing the level of protection of Koala habitat within the offset area; ▪ Improving the condition of Koala habitat on private land through the management of fire, grazing, weeds and pest animals; ▪ Locating the offset area in a strategic corridor containing state-significant connectivity values and other offset areas for other projects; ▪ Considering the threat of drought when proposing management measures such as the installation of supplementary water points; ▪ Implementing on-ground restoration practices based on published, peer-reviewed data; and ▪ Managing grazing intensity and fuel loads to lessen the risk of intense, large-scale fires.

Document	Priority Actions	Implementation
	▪ To implement on-ground revegetation or restoration programs; ▪ To develop and implement fire management that effectively secures and promotes long-term, strategic and effective protection of populations; and ▪ To undertake active metapopulation management through consideration of genetics, disease and connectivity when translocating or releasing individuals.	
Approved Conservation Advice for Geophaps scripta scripta *(Squatter Pigeon southern)* (TSSC 2015)	The advice recommends the following conservation and management actions for the Squatter Pigeon: ▪ Identify sub-populations of high conservation priority, especially in the southern part of the Squatter Pigeon's range; ▪ Protect and rehabilitate areas of vegetation that support important sub-populations; ▪ Protect sub-populations of the listed subspecies through the development of covenants, conservation agreements or inclusion in reserve tenure. ▪ Develop and implement a stock management plan for key sites. ▪ Develop and implement a management plan, or nominate an existing plan to be implemented, for the control and eradication of feral herbivores in areas inhabited by the squatter pigeon (southern). ▪ Raise awareness of the squatter pigeon (southern) within the local community, particularly among land managers.	While the offset area is not within the southern part of the Squatter Pigeon's range, the offset area will be afforded extra protection through a voluntary declaration. The offset also involves managing grazing intensity to maintain grass cover in a favourable range for the Squatter Pigeon to feed and breed. Stock management and pest animal management are incorporated into this OAMP. The offset will be implemented by local landholders, raising local awareness about the species.
Threat Abatement Plan for predation by the European red fox (DEWHA 2008)	The following are the objectives of the threat abatement plan: ▪ To prevent foxes occupying new areas in Australia and eradicate foxes from high-conservation-value islands; ▪ To promote the maintenance and recovery of native species and ecological communities that are affected by fox predation; ▪ To improve knowledge and understanding of fox impacts and interactions with other species and other ecological processed; ▪ To improve the effectiveness, target specificity, integration and humaneness of control options for foxes; and ▪ To increase awareness of all stakeholders of the objectives and actions of the plan and of the need to control and manage foxes.	Feral predator management is incorporated into the OAMP. The offset area is near the northern edge of the fox's current range in Australia. Monitoring of feral predators forms part of this OAMP and aligns with the threat abatement plan's recommendation to monitor fox's distribution at the edge of their extent. Coordination of feral predator management over multiple adjoining offset areas on the same large property reduces the speed of reinvasion. Feral predator management will utilise the best-practice control methods recommended by government.
Threat Abatement Plan for predation by feral	The following are the objectives of the threat abatement plan:	Feral predator management is incorporated into the OAMP. The techniques used for control consider local landscapes

Document	Priority Actions	Implementation
cats (Department of the Environment 2015)	▪ To effectively control feral cats in different landscapes by timing control to coincide with periods of highest predation risk and utilising methods most suitable for the local landscape; ▪ To improve effectiveness of existing control options for feral cats, by providing incentives to landholders to control cats, and by ensuring that areas prioritised for cat control maximize benefits to biodiversity; ▪ To develop or maintain alternative strategies for threatened species recovery, such as the introduction of the species to offshore islands or fenced reserves free of cats; and ▪ To increase public support for feral cat management and promote responsible cat ownership.	and potential for collateral impacts to non-target native species. As the offset area supports multiple MNES, the benefits to biodiversity of feral predator control are high. Suitable habitat for Squatter Pigeons is not known to occur on predator-free islands or in currently fenced reserves. The offset area is too small to warrant the construction of a predator-proof fence around it, as it would not be able to support sustainable populations of cat-sensitive species.
Threat Abatement plan for competition and land degradation by rabbits (Department of the Environment and Energy 2016)	The following are the objectives of the threat abatement plan: ▪ To strategically manage rabbits at the landscape scale and suppress rabbit populations to densities below threshold levels (i.e., 0.5 rabbits per ha) in identified priority areas; ▪ To improve knowledge and understanding of the impact of rabbits and their interactions with other species and ecological processes; ▪ To improve the effectiveness of rabbit control programs; and ▪ To increase engagement of, and awareness by, the community of the impacts caused by rabbits, and the need for integrated control.	Rabbits generally occur in low densities in the Northern Bowen Basin, where heavy summer rainfall floods burrows, mosquito-borne disease is prevalent and high night-time temperatures are near the species' physiological limits. In the unlikely event that rabbit densities increase above threshold levels, an impact on vegetation health is expected during monitoring carried out under this OAMP. If this occurs, response measures may include active rabbit control.

4 Impact Site

The VCP lies within the Northern Bowen Basin subregion (less than 1 km from its boundary with the Isaac-Comet Downs subregion) of the Brigalow Belt Bioregion. The Project falls within the local government area of the Isaac Regional Council. It lies adjacent to Saraji Road, 33 km south-south-east of Moranbah and 34 km north-north-west of Dysart. The Project will be undertaken within ML700060, on lot 10 plan SP208611. The Project has a life of mining of four years, followed by land rehabilitation. Habitat values for the Koala and Squatter Pigeon have been incorporated into the rehabilitation completion criteria within the Project's Progressive Rehabilitation and Closure Plan, such that impacts to these species are anticipated to last up to 20 years from the Project's commencement.

The habitat quality of the impact site, as assessed in September-October 2020, is described in the VCP Environmental Offsets Strategy. This Environmental Offsets Strategy also describes the methodology and scoring system adopted for generating species-specific habitat quality scores based on the *Guide to determining terrestrial habitat quality version 1.3* (DES 2020a). Minor adjustments to the scoring system presented in the Environmental Offsets Strategy (namely, the removal of "clearing" as a threat) were carried out following feedback from DAWE. As a result, the scores presented for the impact site in **Table 4** differ slightly from those presented in the Environmental Offsets Strategy. For the revised scoring system, refer to **Section 12.1.2**.

This timing of the initial site assessment was outside the optimal wet season window (February-April) for assessing vegetation condition, but was adopted to expedite the search for potential offset sites. As this initial survey coincided with a dry period, those environmental variables that are most sensitive to recent weather (i.e., understorey species richness, amount of ground cover, weed cover) were reassessed at the same time as the offset site was assessed (15-16 July 2021), so that the results are directly comparable.

The reassessed understorey attributes did not contribute to the habitat quality scores for the Koala. When the habitat quality score for the Squatter Pigeon was recalculated using the new understorey data, there was no change to the scores for feeding or breeding habitat (both were 6.35/10 when assessed using data from September 2020 and July 2021).

The scale of the impacts of the VCP on the Koala and Squatter Pigeon are summarised in **Table 4**.

Table 4 Impact of the VCP on matters of national environmental significance

Prescribed Matter	Status	Area of disturbance	Habitat score
Koala	Vulnerable	203.5 ha	3.59/10
Squatter Pigeon: Foraging Habitat	Vulnerable	209.8 ha*	6.35/10
Squatter Pigeon: Breeding Habitat	Vulnerable	170.0 ha	6.35/10

*Breeding habitat overlaps with foraging habitat such that only 39.8 ha of foraging habitat is not also breeding habitat.

5 Offset Site

5.1 Location

The selected property for the offset site is a portion of "Ellensfield" (Lot 13 SP178466), the entire property being 19,450 ha in area. The property is located within the Northern Bowen Basin subregion of the Brigalow Belt bioregion. The offset site is 57 km north of the VCP impact area (see **Figure 1**).

The property was selected for its suitability, including:

- Proximity to the impact site (**Figure 1**);
- Proximity to state biodiversity corridors or linking to other areas of conservation. The Ellensfield offset area is located within a corridor of State significance (**Figure 2**);
- Field-verified biodiversity values present on the property (**Sections 5.5** and **5.7**);
- The property management objectives align with the offset management objectives; and
- The potential to locate future offsets on the same property for other projects, thus creating larger areas of biodiversity offsets and achieving improved environmental outcomes.

The proposed offset area is 738.7 ha in size. The surrounding land uses are primarily cattle grazing and coal mining.

5.2 Connectivity

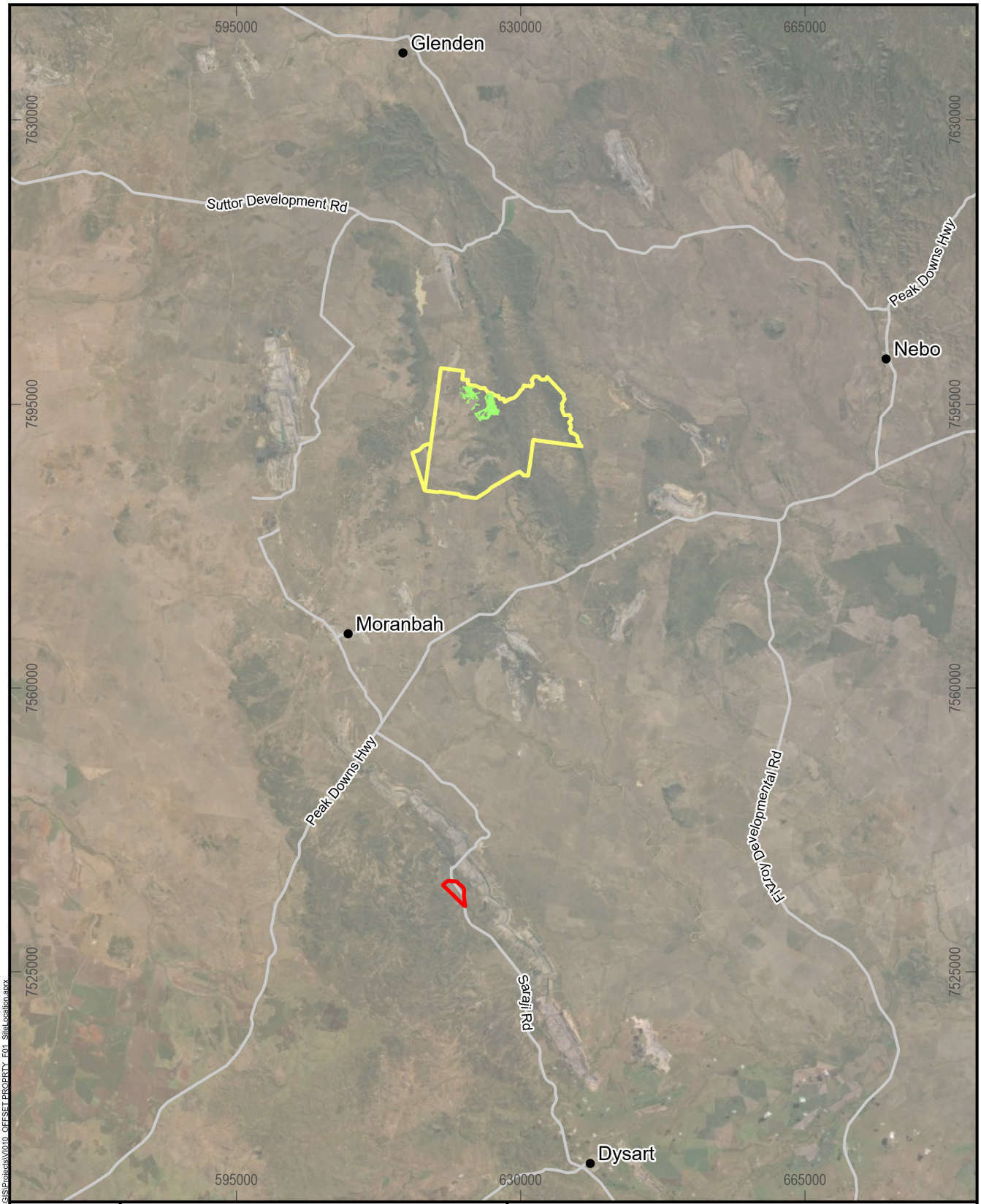
The offset site adjoins a biodiversity corridor of state significance along the Carborough-Kerlong Range immediately east of the offset site. Enhancing the quality of habitat adjacent to this corridor will increase the size and functionality of this corridor. Furthermore, offset sites are proposed for three other projects within the same property. Clustering offsets for multiple projects within the same region will lead to cumulative benefits (e.g., feral predator control) that are more difficult to achieve at single offset sites.

The offset site comprises a single, connected patch of vegetation, rather than multiple, isolated patches. This facilitates fauna movement within the offset site and between the offset site and neighbouring habitat corridors.

5.3 Existing Protection

The existing level of protection is an important consideration for potential offset areas. An offset has maximum benefit if it delivers a high level of protection to areas that otherwise had a high risk of loss. Offsets are only suitable for areas of land that are not fully protected from clearing by other laws or legal instruments.

Despite the fact that remnant vegetation is protected in Queensland as category B regulated vegetation under the *Vegetation Management Act 1999* (VM Act), a small amount of clearing occurs annually through exempt works and illegal activities. In a cattle grazing property such as Ellensfield, such exempt works include clearing for fodder harvesting, ensuring public safety, building a residence, reducing hazardous fuel loads, harvesting timber to repair infrastructure, managing thickened vegetation, and establishing fences, tracks and firebreaks.



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METSERVE Mining & Energy Technical Services Pty Ltd

Legend

- Town
- Road
- Lot 13 SP178466
- ML700060 Impact Site
- Offset Area

Source: State of Queensland (Department of Resources) 2021; Esri, GEBCO, DeLorme, NaturalVue, Earthstar Geographics

VULCAN COAL MINE

Regional Location

0 5 10 20

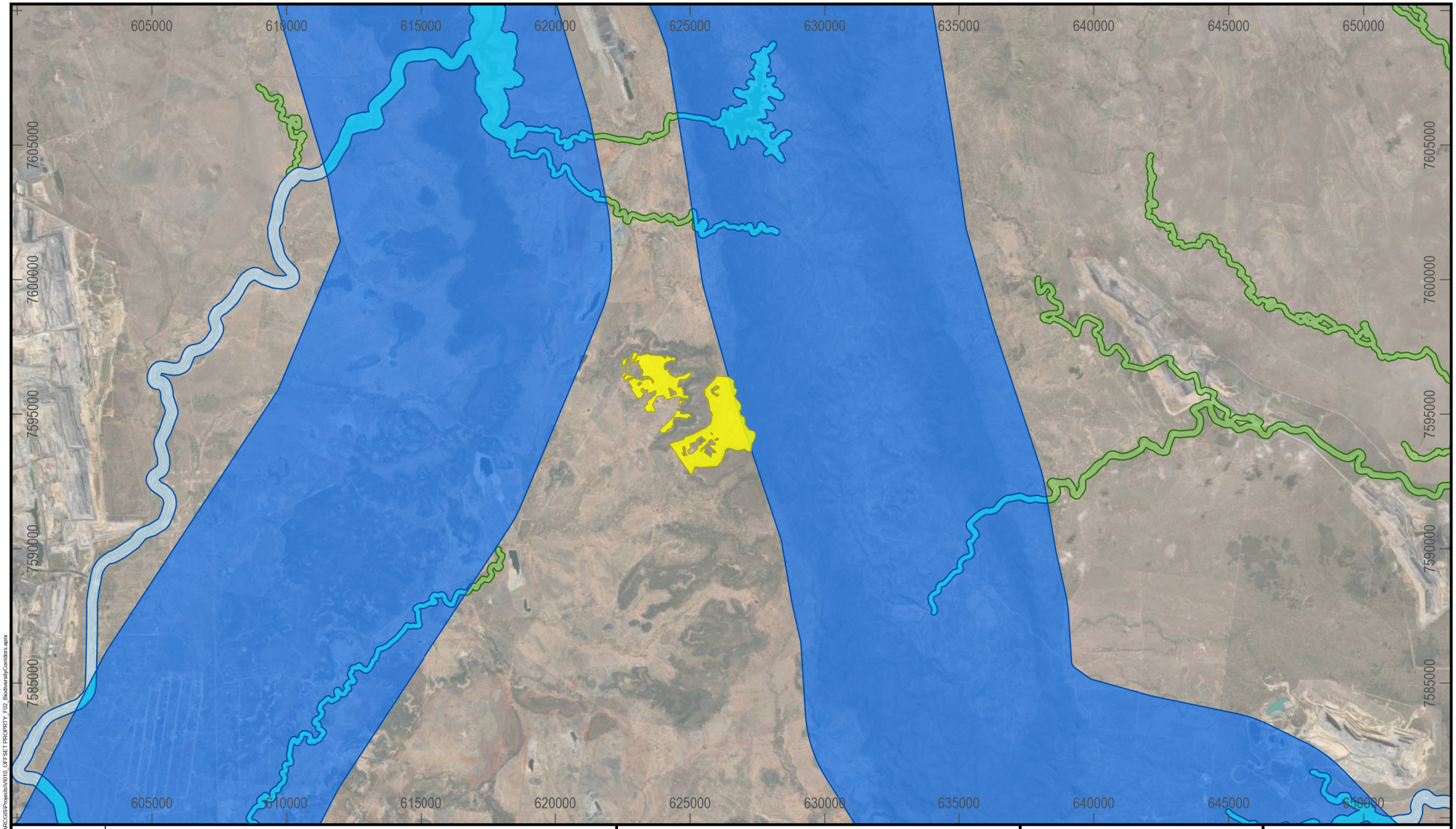
Kilometers

Scale: 1:680,000(A4)

12/11/2021

Datum: GDA94
Projection: MGA55

FIGURE 1



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Legend

Biodiversity Corridors
- State - Riparian
- State - Riparian + Terrestrial
- State - Terrestrial
- Regional - Riparian

Offset Area

VULCAN COAL MINE

State Biodiversity Corridors

Source: State of Queensland (Department of Environment and Science) 2019; Earthstar Geographics.

0 2 4 8
Kilometers

Scale: 1:200,000 (A4)

12/11/2021

Datum: GDA94
Projection: MGA55

FIGURE 2

Path: S:\Projects\V8\10_Vulcan_Complex_Project_Jupiter_section\ARCGIS\Projects\V8\10_OFFSET PROPRTY_F02_BiodiversityCorridors.aprx

In their report, *Guidance for Deriving 'Risk of Loss' Estimates When Evaluating Biodiversity Offset Proposals under the EPBC Act*, The University of Queensland (2017) recommends that 'risk of loss' estimates be based on recent background clearing patterns in the region of interest. This report also presents background clearing rates for each local government area in Australia. While useful as a guide, these clearing rates do not take into account more recent data published since 2014. Furthermore, these clearing rates do not consider the differing risk of loss experienced by vegetation growing on different land zones (plains and more fertile clay soils are under greatest pressure for agriculture), tenure types, and with varying levels of protection under the VM Act.

The approach taken in this OAMP is based on the principles of the *Guidance for Deriving 'Risk of Loss' Estimates When Evaluating Biodiversity Offset Proposals under the EPBC Act* (University of Queensland 2017). Background clearing rates were calculated by overlaying the Statewide Landcover and Trees Study (**SLATS**) clearing data (DES 2020b) for the periods 2015-2016 and 2016-2017 with version 10 of regional ecosystem mapping published by the Queensland Herbarium. Then, SLATS data for 2017-2018 was overlaid with version 11 of regional ecosystem mapping. This ensured that the clearing data corresponded with the vegetation present at the start of each period. Each bioregion was divided by land zone, tenure type and category of regulated vegetation.

Ellensfield has a leasehold tenure. Based on the Vegetation Management Regional Ecosystem Map, most of the offset site is mapped as land zone 5 (sand plain), which has a higher-than-average background rate of clearing within the Brigalow Belt bioregion. According to the Regulated Vegetation Management Map, the offset site comprises a mixture of remnant and non-remnant vegetation types (**Table 5; Figure 3**).

Based on recent historical clearing rates within land zone 5 on leasehold land within the Brigalow Belt bioregion, it is estimated that the offset site currently has a risk of clearing over 20 years of 8.63%. This suggests that important conservation gains can be made by increasing the level of protection of this habitat through a Voluntary Declaration under the VM Act.

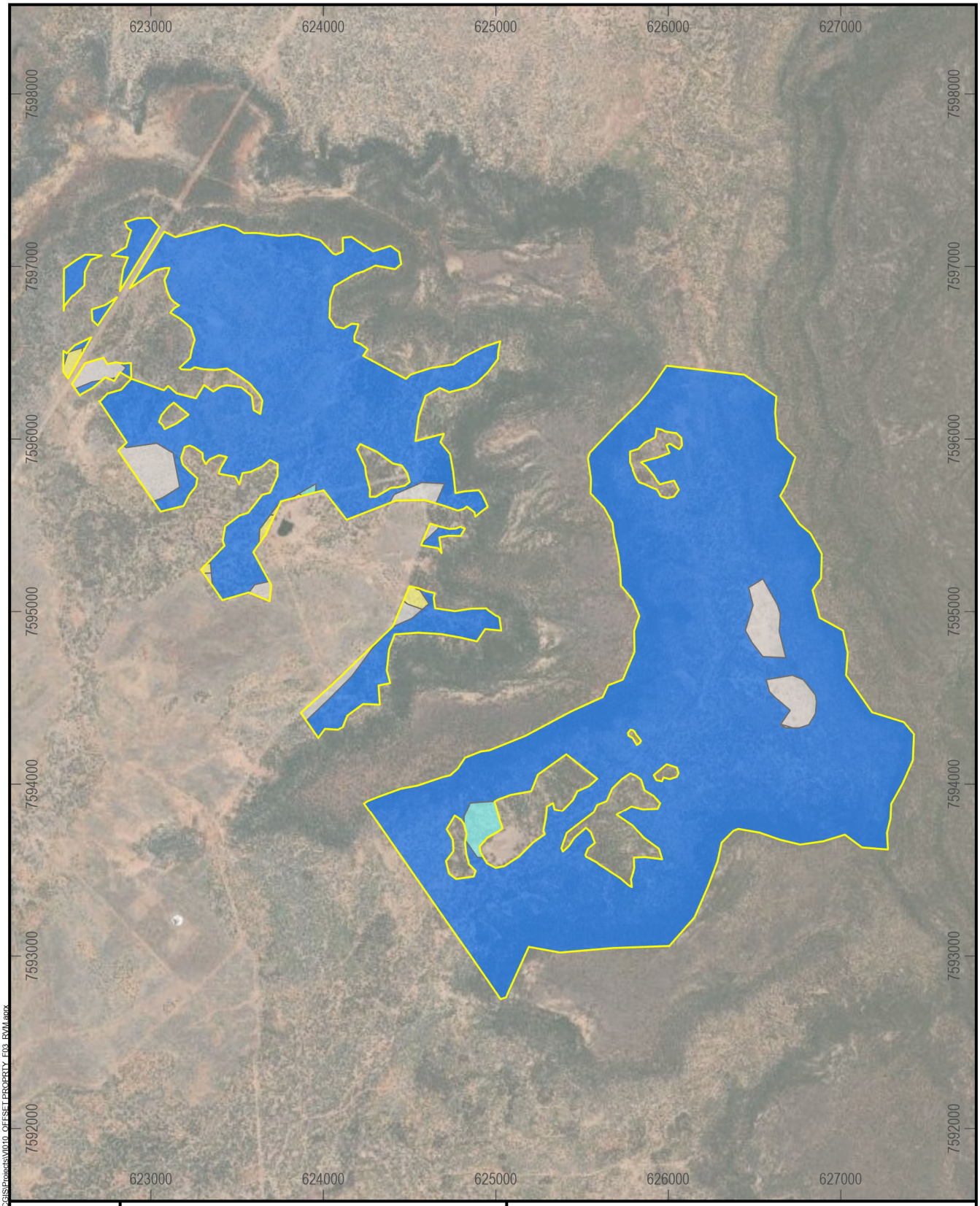
Table 5 Existing status of vegetation within the offset area and the current risk of clearing

Regulated Vegetation Category*	Area (hectares)	Percentage of total	Percentage loss: 2015-2018	Risk of clearing over 20 years†
B: Remnant vegetation	700.6	94.85%	1.16%	7.73%
C/R: Protected regrowth‡	8.0	1.08%	2.69%	17.93%
X: Unprotected regrowth	30.0	4.07%	5.08%	33.87%
Total	738.7	100%		8.90% (weighted mean)

*Status under the VM Act

†Clearing rates are based on recent historical clearing patterns on leasehold land, in land zone 5 within the Brigalow Belt bioregion.

‡Category R regrowth was not recognised under the VM Act during the period of data collection, but is assumed to have similar background clearing rates to category C regrowth.



Legend

- Offset Area

Regulated Vegetation Management Map

- Category B
- Category C
- Category R
- Category X

Source: State of Queensland (Department of Resources) 2021; Maxar.

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VULCAN COAL MINE

Regulated Vegetation Management Map

0 0.25 0.5 1

Kilometers

Scale: 1:32,000 (A4)

12/11/2021

Datum: GDA94
Projection: MGA55

FIGURE 3

Path: S:\Projects\V010_Vulcan_Complex_Project_Junior_section\ARCGIS\Projects\V010_OFFSET_PROPERTY_F03_RVM.aprx

5.4 Landscape

Ellensfield supports a diverse range of landforms, from broad sandy colluvial plains to steep, rocky plateaux. The Carborough-Kerlong Range, which passes through the property, is comprised of micaceous sandstones and siltstones. This rugged landform is not generally favoured by Squatter Pigeons and was therefore avoided by the offset site.

The offset site lies in the western foothills of the Carborough-Kerlong Range, where jump-ups and low mesas comprising sandstones and mudstones are separated by valleys derived from the same sedimentary parent rock. The mesas are covered with a dense growth of *Acacia shirleyi,* which generally does not provide suitable habitat for the Koala or Squatter Pigeon. The offset site has therefore been positioned within the valleys and foot-slopes between these mesas.

The offset site contains first- and second-order streams, but these are dry for most of the year and have little value as a water source for fauna. While not contained within the offset site, two farm dams are located within 100 m of the offset site boundary. These provide permanent surface water for fauna inhabiting the offset site.

5.5 Vegetation Type

The certified regional ecosystem mapping of the offset site maps all local vegetation as mixed polygons, each containing multiple regional ecosystems. Furthermore, field surveys suggested that most of these regional ecosystems were misclassified. As the first step in the calculation of habitat quality scores is the division of the offset site into assessment units, each containing a single regional ecosystem of a single broad condition state, an accurate, field-verified regional ecosystem map was required. How this was produced is described in the following subsections.

5.5.1 Field Surveys

A 1,306-ha area containing the offset site was surveyed by Agri and Environment Solutions Pty Ltd on 12 to 16 July 2021. Ten days prior to the field assessment, 100 to 160 mm of rain fell across the site over a three-day period. This stimulated a flush of growth and flowering of some grasses and forbs.

Vegetation unit boundaries were mapped using high-resolution satellite imagery (80 cm resolution) acquired using the DMC-3 constellation of satellites (publicly available through the Queensland Government's Queensland Globe website). The identity of each vegetation unit was confirmed during field surveys, and a regional ecosystem was assigned to each based on version 12 of the Queensland Herbarium's (2021a) Regional Ecosystem Description Database. The underlying geology on which each regional ecosystem's land zone was based was inferred from 1:100k detailed surface geology mapping, as shown on Queensland Globe.

5.5.2 Regional Ecosystem Mapping

Five regional ecosystems (**REs**) are present within the mapped area containing the offset site (**Table 6; Figure 4**).

The offsite site comprises two broad valleys. The slopes and raised areas around the edge of the western valley support Yapunyah (*Eucalyptus thozetiana*) woodland on lateritic scarp retreat and lower slopes (RE 11.7.1). The Koala secondary food tree *Eucalyptus crebra* was a frequent subdominant component of this vegetation unit. However, because this unit could not improve much in quality with management, only small areas were included within the offset area.

The slopes of the eastern valley are vegetated with a mixture of eucalypt species dominated by Narrow-leaved Ironbark (*E. crebra*), a Koala secondary food tree (RE 11.7.6).

Table 6 Regional Ecosystems confirmed within the offset survey area

Regional Ecosystem	VM Act Status	Short Description	Area (ha) within Offset Area
11.3.4	Of Concern	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains	65.03
11.7.1	Least Concern	*Acacia harpophylla* and/or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. microcarpa* woodland on lower scarp slopes on Cainozoic lateritic duricrust	20.0
11.7.6	Least Concern	*Corymbia citriodora* or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust	240.5
11.9.5*	Endangered	*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks	0
11.9.7	Least Concern	*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	400.64
Non-remnant 11.9.7	Least Concern	*Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	12.39

*The offset site has been positioned to exclude this regional ecosystem as it does not provide habitat for both matters requiring offsetting.

The undulating plains within the two valleys support woodlands dominated by Poplar Box (*Eucalyptus populnea*), a Koala secondary food tree (RE 11.9.7). These occur on duplex clay soils derived from mudstones and lithic sandstones. Small patches of Brigalow (*Acacia harpophylla*) are present throughout these plains, which are mapped as RE 11.9.5. These patches are excluded from the offset area, as they mostly lack Koala food trees.

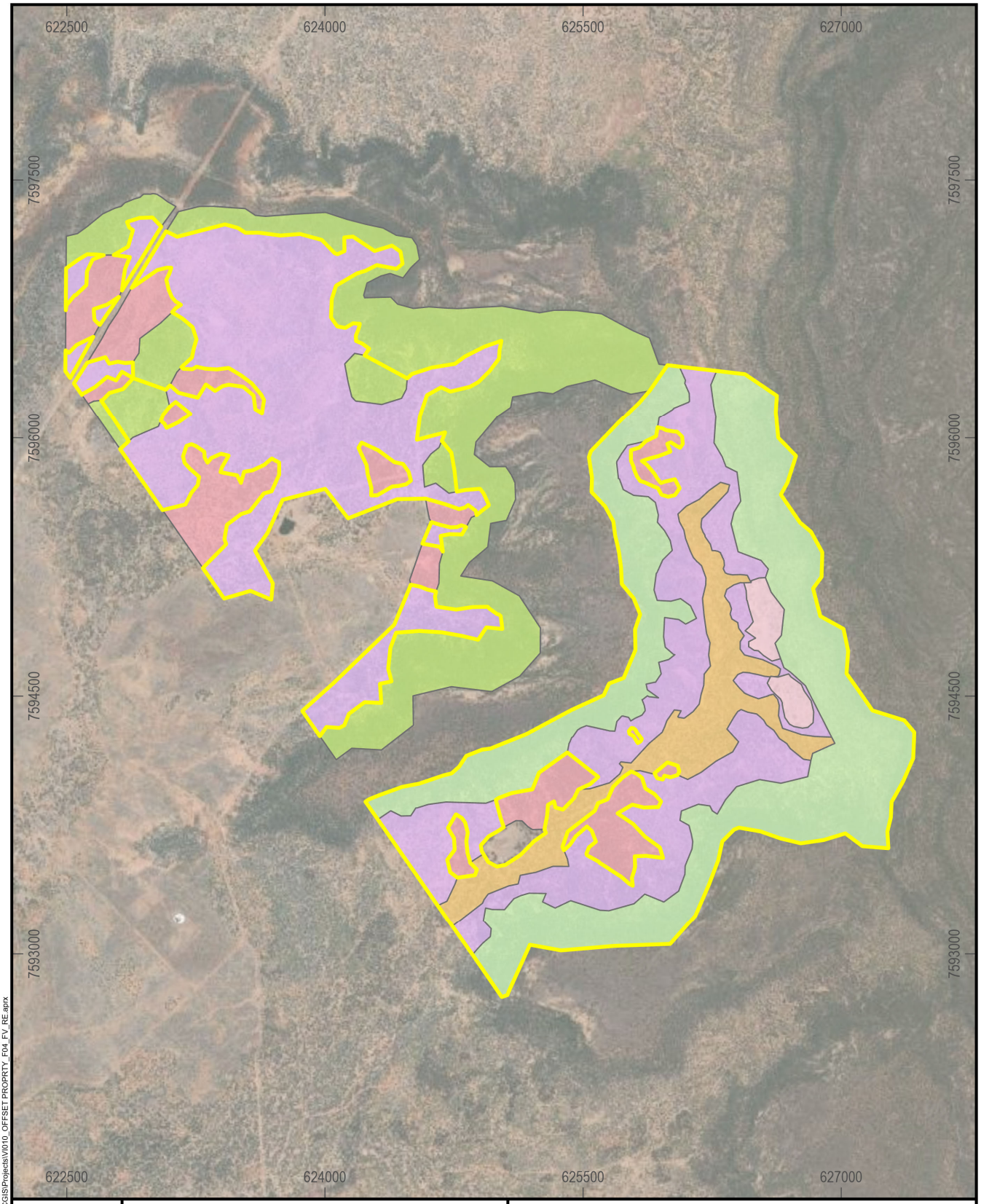
The eastern valley also supports a well-developed alluvial system fed from streams originating on either side of the valley, but especially from the east. These alluvial areas support an open forest dominated by Forest Red Gum (*Eucalyptus tereticornis*), a Koala primary food tree. A distinct riparian zone was lacking and the RE is best considered 11.3.4.

5.5.3 Condition States

All regional ecosystems present within the offset site are represented by remnant vegetation. Despite some portions of the offset survey area being mapped in the Regulated Vegetation Management Map as category C, R or X vegetation (regrowth classes with lower levels of protection than remnant vegetation), all vegetation in the offset site meets the definition of remnant vegetation used in the VM Act (i.e., vegetation with more than 50% of the undisturbed canopy, more than 70% of the undisturbed height, and composed of species characteristic of the undisturbed canopy). Therefore, all regional ecosystems were present in a single condition state (remnant). The exception is RE 11.7.6, which is also present in a non-remnant state in a small area of the eastern valley. During habitat quality assessments, this small area is treated as a separate assessment unit from the remnant forms of RE 11.7.6.

The whole offset site was subjected to intensive logging of species suitable for timber and sleepers for the Goonyella Rail line when this was constructed in the late 1960s and early 1970s. The small number of large trees at many sites is testament to this and ongoing selective harvesting.

While Poplar Box was generally not harvested for timber (due to poor form), these were also subjected to some amount of selective thinning in the past. The few old stags still standing across the offset site show signs of ringbarking and/or poisoning. Ringbarking was a common method of clearing in this area in the 1920s to 1960s, while herbicide applied to cuts in the trunk gained popularity in the late 1960s until the 1990s. While these woodlands have since regained structural attributes that qualify them as remnant vegetation under the VM Act, large trees are generally scarce.



Path: S:\Projects\VI010_Vulcan_Complex_Project_Jupiter_section\ARCGIS\Projects\VI010_OFFSET PROPRTY_F04_FV_RE.aprx

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Legend

- Offset Area

Assessment Units

- 11.3.4
- 11.7.1
- 11.7.6
- 11.9.5
- 11.9.7
- Non-rem 11.9.7

Source: METServe 2021; Maxar.

VULCAN COAL MINE

Field-verified Regional Ecosystems

0 0.25 0.5 1

Kilometers

Scale: 1:32,000 (A4)

15/11/2021

Datum: GDA94
Projection: MGA55

FIGURE 4

5.6 Presence of Matters of Interest

5.6.1 Koala

The nearest public record of a Koala is 23 km northeast of the offset site (a WildNet record from 2014), a location that is connected to the offset site by extensive tracts of remnant vegetation.

Habitat for the Koala is defined as any forest or woodland (including remnant, regrowth and modified vegetation communities) containing species that are Koala food trees or any shrubland with emergent Koala food trees. Suitable food trees for Koalas present within the offset site include *Eucalyptus tereticornis, Eucalyptus crebra* and *Eucalyptus populnea.* The first species is listed as a primary food tree within the Isaac Regional Council area, while the latter two species are secondary food species (Australian Koala Foundation 2015).

Targeted searches for the Koala were carried out during habitat quality assessments. These involved searching for individuals sheltering in trees, as well as indirect signs of the species' presence (scats and scratch marks). In addition to the diurnal searches carried out over the three days of habitat quality assessment, nocturnal, spotlighting transects were undertaken over two nights, targeting the Koala.

While no individual Koalas were directly observed within the offset site, evidence of their presence (i.e. scratches) was observed at three locations (monitoring sites VOA8, VOA13 and VOA14: see **Section 12.1.2**).

5.6.2 Squatter Pigeon

The nearest public record of a Squatter Pigeon is 4.5 km west of the offset site (a WildNet record from 2001). There are nine public records of the species within a 20 km radius of the offset site, in most cardinal directions, suggesting that the offset site is connected to a large population of the species.

Squatter Pigeons were observed frequently within the offset area during habitat quality assessments, with sightings in or adjacent to monitoring sites VOA1, VOA3, VOA9, VOA14, as well as at the two dams just outside the offset area (see **Section 12.1.2** for locations).

The entire offset site currently qualifies as foraging habitat for the Squatter Pigeon, as this comprises "remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by *Eucalyptus*, *Corymbia*, and *Acacia* species, on sandy or gravelly soils within 3 km of a permanent or seasonal waterbody". A subset of the offset site (31%; 228.8 ha) also qualifies as breeding habitat, as this occurs within 1 km of farm dams that provide a permanent water source for Squatter Pigeons (**Figure 5**). Through the provision of three additional artificial water points (e.g., troughs, dams and bores), breeding habitat will be extended across 94% of the offset site (697.5 ha).

5.7 Starting Habitat Quality Scores

In order to assess the suitability of a proposed offset using the Offset Assessment Guide, the starting habitat quality must be known. Habitat quality scores may differ between matters utilising that same habitat. The methodology used for generating habitat quality scores for the Koala and Squatter Pigeon is described in the following subsections.

5.7.1 Methodology

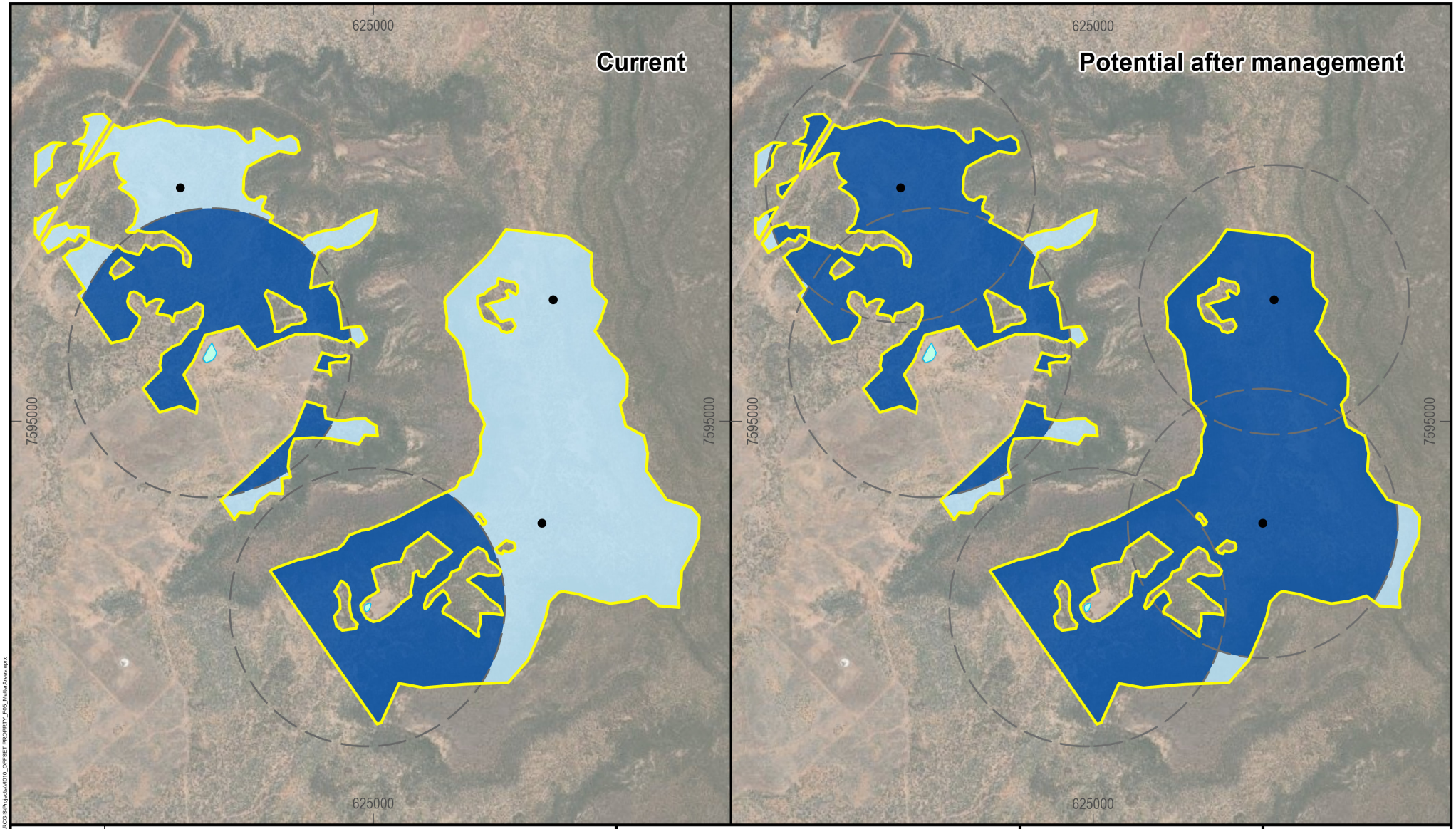
The methodology to be adopted when undertaking habitat quality assessments with regard to environmental offsets in Queensland is prescribed by the *Guide to Determining Terrestrial Habitat Quality version 1.3* (DES 2020a). DAWE recommended that this guideline is used to inform habitat quality inputs in the Offsets Assessment Guide.

This guideline proposes two methodologies for assessing habitat quality:

- BioCondition assessments conducted in accordance with the *BioCondition Assessment Manual version 2.2* (Department of Science, Information Technology, Innovation and the Arts 2015); and
- Specially tailored, species-specific habitat quality scores developed by considering the foraging, breeding, sheltering and dispersal requirements of each species, along with local threat levels.

The relative weight afforded to each measure of habitat quality is case-specific, and is to be determined by information specific to the matters being considered.

The methodology adopted for measuring habitat quality at the offset site must be identical to that used at the impact site, so that the measures are directly comparable. The methodology and scoring systems applied at the impact site have been developed in consultation with DAWE and are described in detail within the VCP Environmental Offsets Strategy. Minor adjustments to the scoring system presented in the Environmental Offsets Strategy (namely, the removal of "clearing" as a threat) were carried out following feedback from DAWE. For the revised scoring system, refer to **Section 12.1.2**. The same approach used to assess the impact site (see **Section 4**) was used to assess the offset site. Ongoing monitoring of the offset site should utilise a consistent approach, as described in **Section 12.1.2**) to assess habitat quality improvements over time.



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Legend

- New Water Sources
- Offset Area
- Dam
- 1km Buffer

Matter Areas

- Habitat for Koala and foraging habitat for Squatter Pigeon
- Habitat for Koala, and foraging and breeding habitat for Squatter Pigeon

VULCAN COAL MINE

Matter Areas

Source: METServe, 2021; Maxar.

0 0.25 0.5 1

Kilometers

Scale: 1:40,000 (A4)

15/11/2021

Datum: GDA94
Projection: MGA55

FIGURE 5

Path: S:\Projects\V1010_Vulcan_Complex_Project_Jupiter_section\ARCGIS\Projects\V1010_OFFSET PROPRTY_F05_MatterAreas.aprx

5.7.2 Koala

Based on the scoring system presented in **Section 12.1.2** of this OAMP, the starting habitat quality of the offset site for the Koala is 5.4/10 (rounded to 5/10). For a break-down of the scores for each habitat attribute, refer to **Table 7**.

Table 7 Starting habitat quality score for the Koala at the offset site

Site	Assessment Unit	Threats			Food		Shelter			Mobility	Habitat score per site	Mean score per assessment unit	Proportion of total offset survey area	Contribution to total habitat quality
		Road proximity	Dog risk	Drought risk	Basal area of food trees	No. large trees	Canopy cover	No. large non-food trees	Shade trees	Amount of Contiguous habitat				
Maximum score		*8*	*8*	*9*	*20*	*5*	*10*	*10*	*5*	*25*	*100*	*100*	*1*	*100*
VOA1	11.9.7	8	0	9	3	2	4	2	5	25	58	54	0.542	29.29
VOA2	11.9.7	8	0	5	5	1	4	0	5	25	53			
VOA5	11.9.7	8	0	9	3	1	4	0	5	25	55			
VOA16	11.9.7	8	0	0	3	2	7	0	5	25	50			
VOA17	11.9.7 NR	8	0	0	2	1	2	0	0	25	38	38	0.017	0.64
VOA8	11.7.6	8	0	0	2	2	4	0	5	25	46	51.3	0.326	16.71
VOA13	11.7.6	8	0	9	3	3	7	0	5	25	60			
VOA14	11.7.6	8	0	0	3	3	4	0	5	25	48			
VOA3	11.7.1	8	0	9	1	4	7	7	5	25	66	60.3	0.027	1.63
VOA9	11.7.1	8	0	9	2	4	7	0	5	25	60			
VOA10	11.7.1	8	0	5	1	4	7	0	5	25	55			
VOA4	11.3.4	8	0	5	8	2	10	0	5	25	63	66.3	0.088	5.84
VOA6	11.3.4	8	0	9	12	3	7	4	5	25	73			
VOA7	11.3.4	8	0	5	10	2	4	4	5	25	63			
											Starting habitat quality score			**54.12**

The starting score of the offset site exceeds the habitat quality at the impact site, which meets the requirement of the *EPBC Act Environmental Offsets Policy* that a "direct offset must meet, as a minimum, the quality of the habitat at the impact site."

5.7.3 Squatter Pigeon

At the offset site, breeding and foraging habitat for the Squatter Pigeon will overlap extensively but not completely once artificial water sources are introduced as part of offset management. Consequently, separate scores were calculated for each habitat type.

Habitat quality scores for the Squatter Pigeon are derived from a combination of habitat attribute scores and BioCondition, with a weighting of 2:1. These are presented in **Table 8** and **Table 9**, respectively. This generates a starting habitat quality score of 5.83/10 for the Squatter Pigeon foraging habitat and breeding habitat. Despite these scores being 0.5/10 lower than the quality of the impact, all values round to 6/10 in the Offset Assessment Guide.

Table 8 Starting habitat attribute scores for the Squatter Pigeon

Site	Assess-ment unit	Threats	Food					Shelter/ breeding			Mobility	Habitat score per site	Mean score per assessment unit	Proportion of total offset survey area	Contribution to total habitat quality
		Buffel Grass	Predators	Distance to water	Ground cover structure	Understorey richness	TOTAL	Distance to water	NDVI	TOTAL	Contiguous habitat				
Maximum score		*16*	*9*	*1*	*15*	*10*	*25*	*1*	*25*	*25*	*25*	*100*	*100*	*1*	*100*
VOA1	11.9.7	6	3	1	9	3	12	1	25	25	25	71	60.25	0. 542	28.8
VOA2	11.9.7	6	3	1	9	3	12	0	25	0	25	46			
VOA5	11.9.7	6	3	1	9	3	12	1	25	25	25	71			
VOA16	11.9.7	11	3	1	9	5	14	0	25	0	25	53			
VOA17	11.9.7 NR	6	3	1	9	3	12	0	25	0	25	46	46	0.017	0.73
VOA8	11.7.6	11	3	1	9	3	12	0	25	0	25	51	56.33	0.326	16.10
VOA13	11.7.6	11	3	1	15	5	20	0	25	0	25	59			
VOA14	11.7.6	11	3	1	15	5	20	0	25	0	25	59			
VOA3	11.7.1	11	3	1	15	8	23	0	25	0	25	62	73	0.027	10.04
VOA9	11.7.1	11	3	1	12	5	17	1	25	25	25	81			
VOA10	11.7.1	11	3	1	9	3	12	1	25	25	25	76			
VOA4	11.3.4	11	3	1	9	5	14	0	25	0	25	53	58.67	0.088	4.85
VOA6	11.3.4	11	3	1	5	3	8	1	25	25	25	72			
VOA7	11.3.4	11	3	1	9	3	12	0	25	0	25	51			
											Starting species habitat attribute score for foraging habitat*				58.94

*Breeding habitat has slightly different proportions of the assessment units (11.9.7 = 0.539, 11.9.7 NR = 0.018, 11.7.6 = 0.322, 11.7.1 = 0.028, 11.3.4 = 0.093), resulting in a weighted average score of 58.95/100.

Table 9 Starting BioCondition scores

Site No.	Assess-ment Unit	Native plant richness				Median canopy height	Ground cover		Recruitment	No. large trees	Coarse woody debris	Weed cover	Foliage cover		Total score per site	Mean score per assessment unit	Proportion of total offset area	Contribution to total habitat quality
		Trees	Shrubs	Grasses	Forbs		Native perennial grass	Organic litter					Canopy	Shrub				
Maximum score		*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*15*	*5*	*10*	*5*	*5*	*100*	*100*	*1*	*100*
VOA1	11.9.7	5	5	2.5	2.5	5	3	5	3	5	2	3	2	3	57.5	55.8	0.542	30.26
VOA2	11.9.7	5	5	2.5	0	5	3	5	3	0	5	0	3.5	3	50			
VOA5	11.9.7	5	5	2.5	0	5	1	5	3	0	0	3	3.5	3	45			
VOA16	11.9.7	5	5	5	2.5	5	3	5	3	5	5	5	5	3	70.6			
VOA17	11.9.7 NR	5	2.5	2.5	2.5	3	0	5	0	0	0	0	0	3	29.4	29.4	0.017	0.46
VOA8	11.7.6	5	2.5	2.5	2.5	5	3	3	3	5	5	0	3.5	2	52.5	60.2	0.326	19.61
VOA13	11.7.6	5	5	2.5	2.5	3	3	3	5	5	2	5	5	2	60			
VOA14	11.7.6	5	5	5	2.5	3	3	3	3	5	5	5	5	5	68.1			
VOA3	11.7.1	5	5	5	5	5	3	3	3	5	5	5	4	3	70	63.5	0.027	1.72
VOA9	11.7.1	5	2.5	2.5	5	5	1	5	0	5	5	5	4	3	60			
VOA10	11.7.1	5	2.5	2.5	2.5	5	3	5	3	5	5	3	4	3	60.6			
VOA4	11.3.4	5	5	5	5	5	1	5	0	5	2	0	4	3	56.3	56	0.088	4.93
VOA6	11.3.4	5	5	5	2.5	5	0	5	3	5	5	0	5	3	60.6			
VOA7	11.3.4	5	5	2.5	2.5	5	0	5	3	5	0	0	5	3	51.3			
														Starting BioCondition score*				57.01

*Due to the slightly different proportions of the assessment units within breeding habitat, the starting BioCondition score is 56.98/100 for this habitat type.

5.8 Potential for Habitat Improvement

The Offsets Assessment Guide requires an estimation of the projected improvements in habitat quality that can be achieved over 20 years through management, along with an indication of the level of confidence in these projections. Small improvements and/or low confidence result in the need for a greater offset area (i.e., a larger ratio of hectares impacted to hectares offset). To obtain projections with the highest confidence possible, detailed recalculations were undertaken using the following approach:

1. Published scientific literature was consulted to obtain estimates of the expected improvements in the raw data of each habitat attribute over a 20-year timeframe. Studies from the Brigalow Belt, in similar ecological communities and in similar rainfall zones to the offset site were given highest priority when forecasting gains in each habitat attribute. Where available, studies that directly examined individual management measures (e.g., modifications to grazing intensity) were used to forecast gains resulting from these measures. Where studies indicate a range of values to be expected at the offset site, the most conservative option was usually adopted for the forecasts (unless there was a convincing reason otherwise), to ensure high confidence that the eventual gains will meet or exceed the projected gains.
2. The habitat scores for each sampling site were recalculated based on their forecast raw data after 20 years. Improvements arising from each management measure were added separately, to show the relative contribution of each measure to the overall habitat gain; and
3. An overall projection of the habitat quality gain per species was calculated by summing the contributions of each management measure.

5.8.1 Koala

After 20 years, the offset site is expected to have a habitat score that improves by 1.23/10 without any thinning (**Table 10**). Thinning could potentially slightly improve it to 1.29/10, but involves additional risks associated with reduced canopy and increased weed invasion.

A habitat gain of at least 1.23/10 (rounded to 1/10) has a high level of certainty (80-90%), as all components of this gain are based on robust scientific studies undertaken in nearby areas.

The baseline expected improvement in quality without any offsets is 0.12/10 (rounded to 0/10), through increasing basal area of existing trees over time. These gains have high confidence as they are based on data gathered in similar or drier climates than the offset site.

Table 10 Projected habitat quality gains for the Koala

Action	Attribute affected	Likely Gain (out of 10)	Certainty	Justification
Active dog control measures	Threat from dogs	+0.500	High	Scores will automatically rise by this amount if active dog control measures are implemented.
Provision of additional artificial water sources so that 94% of the offset area is within 1 km of permanent water	Threat from drought	+0.41	Certain	Scores will automatically rise by this amount once water sources are installed and maintained.
Allowing food trees to increase in basal area without any active management.	Basal area of food trees; number of large trees	+0.12*	High	Back *et al.* (2009a) found a 20% increase over 20 years in tree circumference in Poplar Box woodlands in central QLD. The starting size of trees and climate were similar to the offset site. This equates to a 44% increase in basal area. Increasing basal area of existing trees will increase scores by +0.092/10. This does not include the contribution of overall basal area from additional trees that may recruit over the next 20 years. Taylor *et al.* (2014) found that recruitment barely surpasses natural mortality over a 5-year study of remnant woodland, suggesting that contribution of recruitment to total basal area will be

Action	Attribute affected	Likely Gain (out of 10)	Certainty	Justification
				negligible, except within the non-remnant assessment unit. Consequently, baseline increases in basal area without thinning treatments are assumed to derive from expansion of existing trees only.
Thinning non-food trees (removing 1/5 of all trees, but leaving all food trees), increasing the growth rates of retained trees	Basal area of food trees; number of large trees	+0.046	Low	Back *et al.* (2009a) found a 50% increase over 20 years in tree circumference in Poplar Box woodlands that had 80% of trees removed. It is assumed that benefits of clearing are linear, with 0% clearing resulting in 20% increase in circumference and 80% clearing resulting in 50% increase in circumference, such that 20% clearing results in 27.5% increase in circumference. It is also assumed that no Koala food trees are to be removed by the thinning (thinning is to target non-food trees only). In addition to increasing stem circumferences of existing trees, some natural regeneration of seedlings and suckers is expected to fill the spaces created by thinning. Back *et al.* (2009b) found that newly cleared Poplar Box woodlands regrew by 0.587 m^2/ha over the first seven years after clearing. This is an extreme scenario; seedlings had no competition from existing trees, and an abundance of regrowth (especially via root suckers) would have been stimulated by the clearing process. Nevertheless, assuming that 0% clearing results in no gain from recruitment (Taylor *et al.* 2014) and 100% clearing results in 1.6 m^2/ha gain over 20 years from recruitment (Back *et al.* 2009b), a gain in basal area (in m^2/ha) of 1.6×*percentage cleared* can be expected to result from recruitment. The scores shown are the gains that arise that are additional to the background increase in basal area expected without thinning. The gains expected from basal area increases expected in baseline and 1/5 thinning scenarios cause many sites to reach their maximum-possible habitat quality scores for basal area, such that any additional gains in basal area do not result in further score improvements. This is not surprising considering that almost all vegetation onsite is remnant, so already has a relatively high basal area of Koala food trees. It is also the reason that thinning more than 1/3 of trees will not improve habitat quality scores further. The scores assume that canopy cover and weed cover will not be affected (or rather will recover over 20 years). There is considerable risk that this may not occur, so the confidence in these gains is low. In fact, lost canopy cover and increased weed cover have the potential to outweigh gains in basal area of food trees, resulting in a potential net habitat quality loss of thinning.
Thinning non-food trees (removing 1/3 of all trees, but leaving all food trees), increasing the growth rates of retained trees	Basal area of food trees; number of large trees	+0.058	Low	
Thinning non-food trees (removing 1/2 of all trees, but leaving all food trees), increasing the growth rates of retained trees	Basal area of food trees; number of large trees	+0.058	Low	
Moderating grazing intensity to facilitate tree recruitment	Canopy cover	+0.199	High	Beale (2004) found that, in the Mulga Lands of QLD, canopy cover increases by increments of 1%/yr until 35% cover is reached. Further increases are slower, with 0.2%/yr obtained after 35% cover is reached. These rates are conservative, given the wetter climate at the offset site. It is assumed that canopy cover will increase by 1%/yr increments until the published benchmark value (from reference sites) has been attained, after which time it will increase by 0.2%/yr increments. After 20 years, most sites (except the nonremnant) surpass their benchmark values, so there is high confidence in the expected improvements; even if the developmental rates are initially much faster than forecast, these rates will plateau once benchmark canopy cover is reached.

*Without any thinning, the offset area is expected to improve in habitat quality score by +0.12 as a result of increasing basal area of food trees over 20 years. This is the projected future habitat quality improvement that would have occurred even without offsets.

5.8.2 Squatter Pigeon

After 20 years, the offset site is expected to have habitat scores that improve by at least 1.68/10 for foraging habitat and 1.70/10 for breeding habitat, based on management measures associated with certain or highly predictable gains (**Table 11**). Both projected improvements round to 2/10 for the Offsets Assessment Guide. Gains may be as large as 1.73/10 for foraging habitat and 1.74/10 for breeding habitat if understorey diversity also increases over time, although this is predicted with low confidence. Further gains can be achieved via weed control, but this is associated with high costs and high risk of failure. Successful weed control will not be necessary to achieve successful improvements in habitat quality.

The majority of the projected gains result from the installation of water troughs so that 94% of the offset area is within 1 km of water. This vastly increases the total amount of breeding habitat present. Moderating grazing intensity to improve understorey structure is the next largest contributor to overall habitat gain.

Habitat gains of at least 1.68/10 for foraging habitat and 1.70/10 for breeding habitat have a high level of certainty (80-90%), as all components of this gain are based on robust scientific studies undertaken in nearby areas, and the habitat attributes that contribute greatest to the overall gain have a known outcome.

The baseline expected improvement in quality without any offsets is 0/10, as there is no reason to expect that habitat quality should change over the next 20 years if the offset site was not managed as an offset.

Table 11 Projected habitat quality gains for the Squatter Pigeon

Action	Attribute(s) affected	Likely Gain	Probability	Justification
Active feral predator control measures	"Threat from feral predators" component of habitat attribute score	+0.267	High	Scores will automatically rise by this amount if active dog control measures are implemented and effective.
Provision of water troughs so that 94% of the offset area is within 1 km of permanent water	"Breeding" component of habitat attribute score	+1.121 (foraging) +1.136 (breeding)	Certain	Scores will automatically rise by this amount once water troughs are installed, as it creates breeding habitat where there was none previously.
Allowing tree density to increase passively: reducing excessive grass cover.	"Native perennial grass cover" component of BioCondition; "structure of groundcover" component of the habitat attribute score	0	High	The offset site currently possesses an average of 51% vegetative groundcover, which far exceeds 33%, which is the maximum preferred by Squatter Pigeons (DAWE 2021b). 14 out of 17 sites had more than 33% vegetative groundcover. Increasing tree density results in reduced grass and herbage cover. The negative relationship between eucalypt density and grass production can be linear to exponential, depending on tree species, rainfall, soil, fire and grazing (Scanlon 2002). Data from Scanlon and Burrows (1990: **Figure 6**) was used to convert the projected basal area increases at each sampling site, as calculated for the Koala habitat score, to projected changes in vegetative cover of the understorey (an attribute important to Squatter Pigeons). This forecasts a 0 to 36% (mean = 16%) reduction in pasture cover over 20 years, depending on the starting basal area of trees and the dominant tree species. Most of the data gathered on tree-grass dynamics in the Brigalow Belt were from wetter climates than the offset site. As trees exert a greater influence on grass production in areas of lower productivity/rainfall (Scanlon 2002), the impacts of increasing tree cover on grass cover are considered conservative. The BioCondition component of the overall habitat quality score was also amended by reducing the amount of native perennial grass cover projected by the above forecasts, assuming that the ratio of perennial grass cover to other understorey plants remains constant. The small losses through decreased BioCondition score are

Action	Attribute(s) affected	Likely Gain	Probability	Justification
				predicted to cancel out the small gains in improved structure of the groundcover, such that no net gains are expected.
Allowing tree density to increase passively: reducing cover of Buffel Grass	Percentage cover of Buffel Grass; "Non-native plant cover" component of BioCondition	0	Moderate	It is unclear whether Buffel Grass density is suppressed by high tree densities, as is observed with other pasture species. In semi-arid, infertile areas, a higher density of Buffel Grass has been recorded beneath Poplar Box than within inter-tree areas (Christie 1975), suggesting that a moderate amount of tree cover possibly benefits this species (by locally improving soil fertility: Christie 1975). A dense low shrub layer is generally associated with lower densities of Buffel Grass, but tree canopy cover appears to have little or no effect (Franks 2002). Fensham *et al.* (2012) even found a positive relationship between Buffel Grass density and canopy cover on infertile sandy soils, but no relationship on more fertile soils. Taking into account all available data, it is unlikely that the cover of Buffel Grass will be reduced by projected increases in tree cover within the offset site over 20 years.
Allowing tree density to increase passively: increasing NDVI	Protective cover component of habitat attribute score	0	Certain	Due to the high existing tree cover at the offset site, >80% of all assessment units exceeds an NDVI of 0.125. Consequently, all units have the highest possible score for protective cover; even though tree cover may increase over time, this will not have any effect on habitat scores.
Moderating grazing intensity (heavy grazing immediately following the growing season, followed by light to no grazing during the remaining months): maintaining vegetative groundcover between 20% and 33%.	"Native perennial grass cover" component of BioCondition; "structure of groundcover" component of the habitat attribute score	+0.292	High	The offset site currently possesses an average of 51% vegetative groundcover, which far exceeds 33%, which is the maximum preferred by Squatter Pigeons (DAWE 2021b). 14 out of 17 sites had more than 33% vegetative groundcover. Grazing management generally has a more pronounced effect on ground-storey composition of plant communities than tree density (Jones *et al.* 2009; Good *et al.* 2012). These effects are also more immediate, compared to those achieved through passive regeneration of trees. Grazing can be an effective conservation tool for managing excessive pasture densities in Queensland, although secondary invasion by the exotic grass Indian Couch (*Bothriochloa pertusa*) may undermine the biodiversity benefits gained by grazing in conservation areas (Lebbink *et al.* 2021). The forecast gains are based on an assumption that cattle are introduced when vegetative groundcover exceeds 33% and are removed when vegetative groundcover is reduced to 20% and no further rainfall is expected. This also takes into consideration the forecast reduction in native perennial grass cover (assumed to be proportional to the total reduction in understorey), part of the BioCondition component of the overall habitat score. The forecast gain assumes that all sampling sites maintain cover between 20% and 33%. If half the sites are marginally under (10-20% cover) or over (33-45% cover), the forecast gain drops to +0.211.
Moderating grazing to improve understorey richness.	Native grass and forb species richness components of BioCondition; understorey species richness component of the habitat attribute score	+0.047	Low	The composition of ground-storey vegetation is typically slow to respond to changes in grazing intensity, compared to the density of this vegetation (Grice and Barchia 1995). However, a 90% reduction in stocking rate within heavily grazed sites in northern Queensland resulted in a 19% to 37% increase in native species richness (measured within 10 m^2 per site) within ten years (Kemp and Kutt 2020). Note that the starting weed densities at the site were relatively low (<5% cover), and it is not known whether similar gains can be achieved where high weed density inhibits the diversification of native species (as at the offset site). Studies by Calvert (2001) found that pastures dominated by non-native Buffel Grass and Indian Couch (*Bothriochloa pertusa*) generally experience increased native species richness when grazing pressure is reduced, while pastures dominated by palatable, perennial grasses such as *Themeda triandra* and *Heteropogon contortus*, experience increased richness in response to grazing.

Action	Attribute(s) affected	Likely Gain	Probability	Justification
				These studies indicate that modest improvements to understorey diversity may be achieved over medium timeframes by optimising grazing intensities, but that the direction of the effect can vary depending on the starting state. Pastures at the offset site are dominated by Buffel Grass and Indian Couch. To be conservative, the forecast gains assume an improvement of groundcover species richness at the lower end of that recorded by Kemp and Kurt (2020), namely 19%. However, this is considered to have low confidence, given the unpredictability of grazing's effect. The optimal grazing pressure for maximising groundcover species richness (likely to be low) may also conflict with the optimal grazing pressure for creating ideal ground cover structure for Squatter Pigeons (likely to be periodically high). In such instances, groundcover structure should be prioritised, as it has the potential to achieve the greatest habitat quality gains.

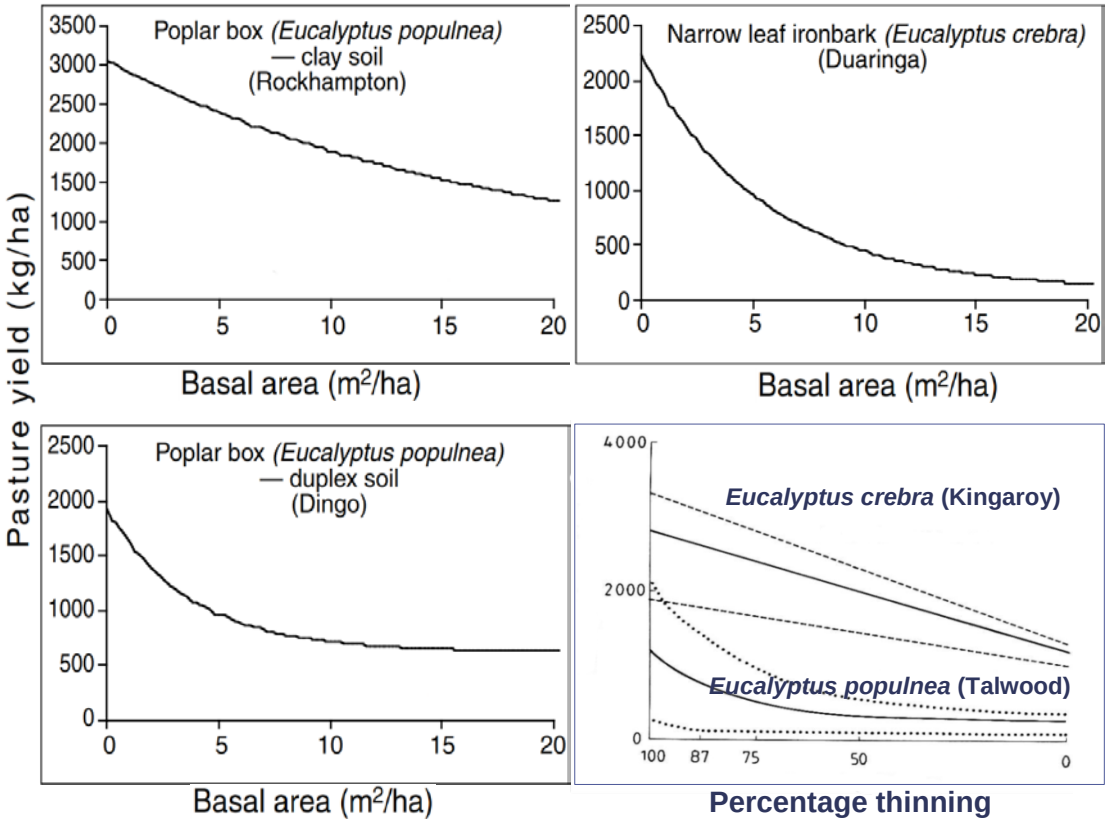


Figure 6 Relationship between pasture productivity and density of woody trees. Panels using basal area for measuring tree density come from Burrows (2002), based on data published by Scanlon and Burrows (1990). The panel using percentage thinning as a measure of tree density comes from Walker et al. (1972, 1986).

6 Offset Completion Criteria and Performance Targets

For an offset to successfully achieve its objective of compensating for the project's impacts on MNES, the following must be achieved:

1. The Offset Assessment Guide must demonstrate that the scale of the offset and the projected gains adequately compensate for the impact (see **Schedule 2**);
2. The projected habitat quality gains used for the Offset Assessment Guide must be achieved on site; and
3. The projected habitat quality gains must be achieved in the timeframe used in the Offset Assessment Guide.

Based on the projected gains used in the Offset Assessment Guide **Schedule 2**, taking into account rounded to the nearest integer, the following completion criteria are proposed:

- The offset area's habitat quality score for the Koala is ≥5.9/10 after 20 years;
- The offset area's habitat quality score for the Squatter Pigeon foraging habitat is ≥7.5/10 after 20 years;
- The offset area's habitat quality score for the Squatter Pigeon breeding habitat is ≥7.5/10 after 20 years; and
- The habitat quality scores have been generated using the same methodology and scoring system applied to assess the impact site and the starting quality of the offset site.

These completion criteria accord with SMART principles, being specific, measurable, achievable, relevant and time-specific. They also allow a degree of flexibility in how the habitat quality gains are being achieved; for example, if grazing management does not deliver a forecast gain, additional weed control could be employed to achieve this. Furthermore, less-than-expected improvements in one assessment unit can be compensated for by greater-than-expected improvements in another assessment unit of comparable size.

In order to monitor the progress of the offset towards its completion criteria, five-yearly interim targets have been developed. These targets are to be assessed during the rounds of monitoring proposed in 2026, 2031, 2036 and 2041. Interim targets have been developed by assigning habitat attributes into two categories:

- Attributes that will result in initial improvements within the first five-year period, then no subsequent changes (e.g., availability of water, exposure to feral predators, grazing impacts on grass cover); and
- Attributes that improve linearly throughout the duration of the offset (e.g., basal area of Koala food trees, understorey species richness, number of large trees).

Then, the overall expected gains discussed in Section 5.8 were recalculated for each five-year period to generate the targets shown in **Table 12**. Note that the largest and most predictable gains arise within the first five-year period. For the Koala, additional gains occurring in later years are not necessary to achieve the projected gain of 1/10. For the Squatter Pigeon, small additional gains are accrued over each monitoring round subsequent to the first.

Table 12 Interim targets and completion criteria

Matter	Impact area (ha)	Habitat quality score	Offset area (ha)	Habitat quality score: starting	Habitat quality score: year 5	Habitat quality score: year 10	Habitat quality score: year 15	Habitat quality score: year 20
Koala	203.5	3.59	738.6	5.4	5.9	5.9	5.9	5.9
Squatter Pigeon (breeding)	170.0	6.35	697.5	5.8	7.2	7.3	7.4	7.5
Squatter Pigeon (foraging)	209.8	6.35	738.6	5.8	7.2	7.3	7.4	7.5

Note that the habitat quality scores are the minimum scores required to achieve interim targets and completion criteria. Scores may be higher than the targets.

PART B: LAND MANAGEMENT PLAN

7 Management Objectives

The following are the management objectives of this OAMP:

- To enhance protection of the offset site from the threat of clearing for the duration of the impact;
- To expand the area of breeding habitat for the Squatter Pigeon by 463.8 ha within the first five years through the installation of additional water sources, and maintain this expanded area for the duration of the impact;
- To improve the habitat quality scores for the Koala by 0.5/10 over 20 years within the offset site;
- To improve the habitat quality scores for the Squatter Pigeon foraging habitat by 1.7/10 over 20 years within the offset site; and
- To improve the habitat quality scores for the Squatter Pigeon breeding habitat by 1.7/10 over 20 years within the offset site.

If the above objectives are successfully achieved, the offset will lead to no net loss for the Koala and Squatter Pigeon as a result of the VCP, as measured using the Offset Assessment Guide.

8 Risks of Failure to Achieve Offset Completion Criteria

Potential risks preventing the achievement of the management objectives are considered in **Table 14**. Each risk has been assessed against the risk matrix (**Table 13**) that was supplied by the DAWE. The risk matrix has been used to assess the risk that the plan's objectives will not be met and identify the sources of those risks and strategies for managing them.

The risk assessment:

a) identifies events that will, may, or are likely to impact the attainment of the completion criteria;
b) assesses the likelihood and consequences of those events, and characterises residual risk levels, taking into consideration the mitigation of the risk by implementing the management actions; and
c) identifies the level of uncertainty in mitigating the risk with the management actions and trigger criteria and corrective actions until the risk is reduced to an acceptable level.

Table 13 Risk matrix

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management activities are 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 incident of environmental damage that can be reversed (*e.g. short-term delays to achieving plan objectives, implementing low-cost, well-characterised corrective actions*)
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. short term delays to achieving plan objectives, implementing well-characterised, high-cost/effort corrective actions*)
High	Substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions*)
Major	Major loss of environmental amenity and real danger of continuing (*e.g. plan objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies*)
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage (*e.g. plan objectives are unable to be achieved, with no evidenced mitigation strategies*)

		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 14 Risk assessment for the offset site

Risk	Threats	Initial risk ranking*			Management measures/actions	Residual risk ranking*		
		L	C	R		L	C	R
Force Majeure Events								
Mining of the offset site	No production permits currently cover the proposed offset site. However, exploration permits for coal and petroleum do cover the site. If open-cut mining were to take place within the offset site, this may result in removal of all habitat present.	Rare	Critical	High	The offset site has been positioned outside areas covered by existing production permits to reduce this risk. The legal security over the site makes it known that the area is an offset. No available legal mechanism would render mining impossible within the offset site. However, a legally secured offset area is a prescribed matter under Queensland's *Environmental Offsets Regulation 2014* and any disturbance to one would itself require offsetting. If the landowner's consent is needed for mining to occur, that consent will not be given. If the landowner/approval holder becomes aware, or reasonably suspects, that any of the following will or may occur: • Consultation process for issuing a new exploration licence, mining lease, or mining approval; • Actual decision on issuing a new exploration licence, mining lease, or mining approval; or • Any exploration or mining activities occurring on the land, or sufficiently close to the land to create a non-trivial risk of impacts (no matter how minor) to the land; they will inform the department within 10 business days. If any of the things above occur, the landowner/approval holder will inform the licence/lease/approval winner that the offset site exists and that any impacts to it run a real risk of being significant, which would trigger a requirement to refer the proposal to the department.	Rare	Critical	High
Drought	Short dry periods coinciding with monitoring events can lead to misleadingly low habitat quality scores associated with grass cover and understorey species richness. Prolonged droughts may result in slower tree growth rates than anticipated over a 20-year period, resulting in smaller habitat quality improvements than anticipated. Extreme droughts may result in large-scale tree death, resulting in severe decreases in habitat quality score.	Likely	Moderate	Medium	Cattle will be excluded from the offset area during times of drought to maintain a minimum cover of ground vegetation. Recent weather conditions are to be considered when assessing the results of monitoring against milestone criteria. No practical measures can be implemented to mitigate the effects of drought on tree growth and recruitment; however, habitat quality improvements resulting from tree growth and development constitute a minority of the total improvements anticipated (see Section 5.8), and most improvements will occur even in the event of extended droughts. In the event of large-scale tree death due to extreme drought, the approval holder and the Department will work together to determine an appropriate response.	Likely	Moderate	Medium
Cyclones/ severe tropical lows/ flooding	Severe cyclones can cause large-scale tree-felling, although such wind speeds are highly unlikely to occur away from the coast, such as where the offset site is located. Moderate damage (fallen limbs and reduced canopy cover) could occur, but is not expected to have lasting impacts. The most likely impact from tropical cyclones or tropical lows in subcoastal locations is heavy rain, leading to flash-flooding and erosion.	Likely	Moderate	Medium	No practical measures can be implemented to mitigate the risk of cyclones. The offset site is located in the upper catchment, where the risk of prolonged or severe flooding is minimal. Flooding is not expected to be of sufficient duration, and winds are not expected to be sufficiently severe, to cause substantial long-term harm to the site. Additionally, increased soil moisture following extreme storm events is expected to increase growth rates, likely assisting natural repair of any potential damage. The risk of erosion will be managed by maintaining groundcover with <50% bare ground.	Likely	Minor	Low
Failure to Reduce Threat of Clearing								
Unauthorised access	Unauthorised access to the offset area may result in the illegal harvesting of timber. It may also cause damage to vegetation through illegal camping and vehicles leaving tracks.	Unlikely	Moderate	Low	The offset area is located on a remote, private property where incursions by the public are infrequent. Complete the installation of signage at all vehicle entry points, identifying the area as an environmental offset, within 12 months of the approval of this OAMP. Complete the installation of any new planned fences, within twelve months of the approval of this OAMP. Field monitoring will report on any evidence of timber harvesting.	Rare	Moderate	Low
Herbicide drift from aerial spraying on neighbouring properties	Tree death can occur through herbicide drift in areas close to those where herbicide is applied. This risk is highest in areas used for cropping, where herbicide use is high, or in grazing areas where Graslan or other herbicides are used to control woody regrowth.	Unlikely	Major	High	The offset area is far from land used for cropping. Ellensfield surrounds the offset area, so the offset area is buffered from neighbouring properties. No aerial herbicide application is to occur on Ellensfield within 500 m of the offset area.	Rare	Major	Medium

Risk	Threats	Initial risk ranking*			Management measures/actions	Residual risk ranking*		
		L	C	R		L	C	R
Inadvertent clearing by landowner due to misunderstanding about offset area boundaries or obligations	A failure to adequately communicate this OAMP with the landowner could lead to clearing of parts or all of the offset area. This risk is highest if a change in land ownership takes place during the offset.	Possible	Major	High	Within 12 months of the approval of this OAMP, a Voluntary Declaration will be registered over the offset area. This OAMP will be linked to the Voluntary Declaration, so that any future landowner can access it. The offset area will be mapped as category A regulated vegetation on Queensland Government mapping, which is the primary tool used by landowners to infer a right to clear. Signage is to be installed at all vehicle entry points, identifying the area as an environmental offset.	Rare	Major	Medium
Failure to Reduce Threat from Feral Predators								
Control measures are insufficient to reduce predator numbers	Predators may become trap-shy and/or bait-shy and therefore not be susceptible to the control measures in place, resulting in an increase in numbers. Failure to maintain low feral predator densities will lead to 0.3/10 less-than-forecast improvement in habitat quality for the Koala and 0.13/10 less-than-forecast improvement in habitat quality for the Squatter Pigeon. These failures are unlikely to prevent achievement of completion criteria for the Squatter Pigeon, but may prevent this for the Koala.	Possible	Moderate	Medium	Investigate potential sources or reasons for an increase in pest animal numbers and rectify. Usage of a diverse range of control measures reduces the risk of failure due to any one method. Current control of pigs and wild dogs is undertaken via a baiting program on the property. This is augmented with shooting and trapping of wild pigs if numbers increase. Additionally, the Pastoral Manager, during quarterly inspections of the offset area may remove any wild cats, pigs or wild dogs that are seen. If an increase in pig or dog activity is recorded, an additional trapping, baiting and/or control program is to be instigated until the increased activity has ceased.	Unlikely	Moderate	Low
Rapid recolonisation of predators from neighbouring areas	Removal of predators within small areas connected to other predator populations results in rapid recolonisation. Failure to reduce feral predator densities will lead to 0.3/10 less-than-forecast improvement in habitat quality for the Koala and 0.13/10 less-than-forecast improvement in habitat quality for the Squatter Pigeon. These failures are unlikely to prevent achievement of completion criteria for the Squatter Pigeon, but may prevent this for the Koala.	Likely	Moderate	Medium	The offset area is situated near the middle of the property, with offset areas for other projects located nearby. Feral predator control over larger spatial scales is more likely to be effective than control over small scales, where recolonisation is rapid. If monitoring reveals no effect of active pest management, the intensity and/or frequency of control measures will be increased to counter recolonisation.	Possible	Moderate	Medium
Installation of supplementary water encourages feral pests	Improved access to surface water may attract predators that are the target of control programs (dogs, cats, foxes), as well as feral pigs, which can damage understorey vegetation and lead to a reduction in habitat quality for the Squatter Pigeon. This risk is low, given that surface water is already widely available in the broader landscape encompassing the home ranges of feral predators.	Unlikely	Moderate	Low	The implementation of an active feral animal control program is expected to mitigate this risk. Fencing around new water sources is a potential option for allowing access by Squatter Pigeons and not predators, but this would also exclude Koalas, so was not considered further.	Unlikely	Moderate	Low
Dog control leads to increased rabbit density	Rabbit densities are currently low in the northern Bowen Basin, but may increase if relieved of predation pressure by cats and dogs. This risk is low, as populations of rabbits in north Queensland are likely limited by climate and other factors unrelated to predation (DPIF 2008). High rabbit densities damage habitat used by Squatter Pigeons and can lead to soil erosion.	Unlikely	High	Medium	If five-yearly monitoring indicates that rabbit densities are reducing habitat quality attributes, a rabbit control program will be implemented. Otherwise, controls are expected to be unnecessary.	Rare	High	Low
Failure to Improve Water Availability								
Poor water availability during drought	New dams may dry out due to drought, resulting in water becoming temporarily unavailable. Severe rainfall deficits may affect multiple water sources simultaneously, potentially reducing availability of water to Squatter Pigeons and Koalas over large areas, at times when a lack of water could have serious implications for the species.	Likely	Moderate	Medium	New water supplies are to utilise a variety of water sources (rainfall, bore water), to lessen dependence on a single source (e.g. rain). Dams already present on site maintain a permanent water supply, suggesting that new dams will be equally successful. Fencing around new dams will exclude stock, maintaining the integrity of banks and maximising storage capacity by reducing siltation.	Unlikely	Moderate	Low
Trough malfunction and/or dam leakage	Leaks or pump malfunctions could lead to water failing to fill the trough from the adjacent tank. Poor dam construction may lead to breaks in the wall or permeable lining. These lead to temporary water unavailability at a single water source.	Likely	Minor	Low	Water sources are to undergo weekly inspections and maintenance. Any malfunctions are to be repaired as soon as practicable and within one month.	Unlikely	Minor	Low
Increased Threat from Fire								

Risk	Threats	Initial risk ranking*			Management measures/actions	Residual risk ranking*		
		L	C	R		L	C	R
Unplanned or non-controlled fire in offset area.	The impact from uncontrolled fire would be a reduction in dry matter yields and overall groundcover, thinning of the canopy, destruction of regrowth and emerging saplings and an overall slowing of the offset site achieving the completion criteria.	Likely	Moderate	Medium	The Ellensfield offset site is comprised of remnant eucalypt species circa 12-22m in height. These communities are adapted to fire and the risk of a 100% loss is low due to lower dry matter yields (fuel load) within the communities that are further managed with grazing.	Possible	Minor	Low
Increased fire risk due to high fuel loads	During periods when a low-level grazing regime has occurred alongside an average or above average wet season, there is an opportunity for fuel loads to accumulate to unacceptable levels. When this occurs and the high levels of fuel are present prior to summer, the risk of wild and/or high-intensity fires is exacerbated.	Possible	High	Medium	Rotational grazing will be implemented to maintain an appropriate level of grass cover for the Squatter Pigeon (10-50% bare ground and 20-33% ground vegetation cover). This is appropriately sparse to limit the risk of hot, uncontrolled fires. In the event that pasture density cannot be reduced to appropriate levels by grazing alone, prescribed burns may be implemented. If required, such burns would involve cold fires lit during the months of June, July, August and September when wind speeds are less than 5km/h.	Unlikely	Minor	Low
Increased Threat from Weeds								
New infestations of restricted invasive weeds in the offset area.	Infestation of previously unidentified invasive weeds within the offset area. If a weed infestation is unchecked, it may cause a significant deterioration in the offset site.	Possible	High	Medium	Investigate potential sources or reasons for new infestation(s) and rectify. The offset area on Ellensfield is remote and access to the offset area will be limited, to reduce/prevent pathogen/propagule transmission vectors. If a new weed infestation is identified, weed management measures will occur as per **Table 15**.	Unlikely	Minor	Low
Expansion of existing infestations of weed species in the offset area	Increasing weed densities reduce habitat quality scores for the Squatter Pigeon directly and indirectly through reducing cover and richness of native understorey species.	Likely	High	High	Investigate potential sources or reasons for an expansion of existing infestation(s) and rectify. Access to the offset area will be restricted. Chemical and/or mechanical control of restricted invasive plants in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets or other sources of information.	Unlikely	Moderate	Low
Inappropriate Grazing Management								
Insufficient levels of grazing	Vegetation communities present in the offset area naturally have a sparse grass cover with many patches of bare ground, which facilitate foraging by Squatter Pigeons. The introduction of exotic pasture species has led to dense swards of grass that reduce habitat quality for Squatter Pigeons. Low grazing pressure can lead to a high ratio of grass cover to bare ground that impedes foraging by Squatter Pigeons. Understorey vegetation that exceeds 33% ground cover is associated with reduced habitat quality scores. Dense herbage and grass cover that cures during the dry season is also associated with increased fire risk, which is a threat to Koalas and Squatter Pigeons.	Likely	High	Medium	The offset area is fenced to contain/exclude cattle but allow movement of Koalas and Squatter Pigeons, and fences will be maintained in working order for the duration of the offset. Grazing of the offset area is to be rotational. Cattle are to be excluded from the offset area during the late dry and wet seasons (exact timing will be dependent on rainfall conditions and pasture growth), and reintroduced at the start of each dry season. This allows grasses and forbs to produce large crops of fallen seed (food for the Squatter Pigeon) prior to cattle being introduced. The introduction of cattle will thin dense grass swards and provide a favourable ratio of grass to bare ground, to provide optimal foraging habitat for the Squatter Pigeon. The exact timing of cattle introduction and removal will be determined by pasture cover, with vegetative groundcover to be maintained between 20% and 33%, the optimal range for Squatter Pigeons. Ground cover maintained in this range is likely to support a low-intensity fire, but unlikely to produce high-intensity fires fatal to Koalas.	Possible	Moderate	Medium
Excessive levels of grazing	High-intensity grazing over extended periods inhibits shrub and native perennial grass cover, and slows the regeneration of habitat. Low vegetative groundcover increases surface run-off of rainwater and encourages soil erosion. Insufficient groundcover vegetation causes reduced habitat quality scores for the Squatter Pigeon.	Likely	High	Medium	Fences are in working order and allow for exclusion of cattle when needed. Cattle are to be removed from the offset area when vegetative groundcover reaches a minimum of 20% (equivalent to a pasture dry matter yield of approximately 1,200 kg/ha), and no further rain is forecast. This will maintain ample protective cover to the soil from erosion and to Squatter Pigeons from predators.	Possible	Moderate	Medium
Thickening of woody vegetation	Prolonged grazing can promote regeneration of unpalatable trees through reduced competition with grass and reduced fire frequency. This can lead to dense stands of small-stemmed trees that compete with each other for resources and limit growth rates of individual trees. This is unlikely to be a significant risk at most sites over a 20-year timeframe. However, due to past timber-harvesting practices at Ellenfield, there are already a high number of small-stemmed trees regenerating. Inhibited growth as a result of high competition results in reduced habitat quality gains associated with increased basal area of Koala food trees and increased number of large	Possible	High	Medium	Ecological burns to be undertaken to reduce the stem density of the eucalypt vegetation when there is a density of >750 immature trees/ha (DNRME 2020). This is done to reduce competition for soil resources and therefore promote larger trees becoming established. Prescribed burns will produce low-intensity fires through being undertaken in winter, to ensure no damage to mature trees. In specific situations (where fire does not kill saplings or where there are a large number of Koala food trees among the saplings), thinning of young regrowth may be required. Thinning will target Koala non-food trees exclusively.	Unlikely	Minor	Low

Risk	Threats	Initial risk ranking*			Management measures/actions	Residual risk ranking*		
		L	C	R		L	C	R
	trees.							
					Failure to Achieve Performance Targets			
Cumulative risks	Minor consequences of multiple risks can combine to cause a failure to achieve and maintain interim performance targets and offset completion criteria.	Possible	High	Medium	The projected habitat quality gains used in the Offset Assessment Guide are considered conservative, as these are based on published scientific studies and the precautionary principle. Risk has also been incorporated into the Offset Assessment Guide outputs used for determining total offset area size (Schedule 2). This means that the performance targets listed in Section 6 can be lower than the gains actually expected and still achieve no net loss of the protected matters. Monitoring of performance every five years allows for the early detection of potential problems, and the opportunity to enact alternate measures to achieve later rounds of performance targets.	Unlikely	High	Medium

*The risk ranking codes relate to the risk matrix as follows: L = Likelihood, C = Consequence, R = Risk

9 Offset Management

The offset site management measures have been prepared in accordance with the specific requirements for the Offset Area Management Plan as detailed in DAWE's request for additional information (**Table 1**).

Most of the management measures are aimed at abating threats to the Koala and Squatter Pigeon, although others serve to improve the amount or quality of habitat present within the offset site.

The management actions include:

- Limiting vegetation clearing to only those areas required for maintaining fencing and fire control lines;
- Prohibiting alternate land use and activities during the period of approval (e.g. timber harvesting, cropping);
- Restricting unauthorised access and disturbance to the Koala and Squatter Pigeon;
- Excluding domestic livestock from the offset area except for the infrequent grazing associated with fuel reduction in dry periods;
- Controlling feral animals;
- Managing fire;
- Controlling weeds;
- Installation of three additional supplementary water points (dams and troughs) to provide a source of permanent water for Koalas and Squatter Pigeons, thereby reducing the risk of drought to the former and increasing the total amount of breeding habitat for the latter; and
- Thinning of dense young regrowth of Koala non-food trees to facilitate growth of retained food trees.

These management measures will be implemented for the duration of EPBC Act approval in accordance with the management schedule presented in **Table 15**.

Table 15 Management actions, triggers and corrective actions

Management Measure	Timing	Responsibility	Performance Monitoring	Performance Trigger	Corrective Actions
Vegetation within the offset area is to be protected through a voluntary declaration under Section 19E and 19F of the VM Act.	The declaration is to be registered within 12 months of the approval of this OAMP, and is to remain in effect for the period of the EPBC Act approval, or until otherwise advised by the Minister in writing.	Vitrinite's Chief Operating Officer	The land manager is to undertake monthly inspections of the offset site to identify signs of unauthorised access and clearing.	The declaration fails to be registered within 12 months of the approval of this OAMP. Any activities in contravention of the Voluntary Declaration.	A failure to register the offset area within 12 months is to be immediately reported to the Australian Government. Upon being notified or becoming aware of prohibited forestry operations, native timber harvesting or clearing: ▪ Step 1: the land manager is to investigate the cause of the trigger (e.g., unauthorised access); ▪ Step 2: the land manager is to assess how unauthorised persons accessed the site, review existing access restrictions, and inspect signage and offset area fencing within one week of detection of the clearing; ▪ Step 3: The Approval Holder is to report the breach within 5 business days of being aware of the incident to the Australian Government consistent with any and all EPBC Act approval(s); and ▪ Step 4: All actions required to prevent recurrence of the prohibited clearing (e.g., additional fencing, signage and/or security) will be completed within two months of detection of the clearing.
Cattle-proof fencing is to be maintained surrounding the offset area.	When required, throughout the duration of offsets.	Land manager	Monthly inspections of fences and for signs that cattle are intruding into, or escaping from, fenced paddocks.	Fences not cattle-proof.	Fences are to undergo repairs within 10 days of a trigger, and escaping cattle returned to their appropriate paddock. Incidents involving breaches of the perimeter fence by cattle are to be recorded in annual reports.
Signage is to be installed at each vehicular entry point into the offset area and kept in good repair throughout the life of the EPBC Act approval. These signs inform visitors that the site is an offset area and unauthorised entry is prohibited. Authorised persons are those required to undertake actions described in this OAMP, including the landholder, and approval holder and their contractors.	Within 12 months of the approval of this OAMP.	Vitrinite's Chief Operating Officer; land manager	Quarterly inspections of signage and entry tracks for signs of unauthorised access.	Signage is absent or illegible. Evidence of unauthorised access.	Regenerating shrubbery that obscures the sign is to be manually removed. Damaged and illegible signs are to be replaced within one month of damage being detected. Sign maintenance is to be undertaken by the Pastoral Manager, Landholder or suitable qualified person appointed by the approval holder. Evidence of unauthorised entry will trigger increased surveillance, fencing or signage, depending on the likely route of entry.
Three supplementary water points are to be installed at locations indicated on **Figure 5**. Troughs are to be accessible to Squatter Pigeons and Koalas and have automated water supply from an adjacent tank. Dams are to be fenced to exclude access by livestock but permit access by Koalas and Squatter Pigeons.	Within one year of the approval of this OAMP.	Land manager	Photographic evidence of each water point is to be taken once installation is complete. The date of completion is to be recorded.	Failure to install all water points within one year of approval of this OAMP.	Water points must be installed as soon as possible and within one month after such failure.
Maintenance of water infrastructure (dams, troughs, tanks and pumps) to maintain (ensure a permanent) water supply.	As required, throughout the duration of the offset.	Land manager	Performance of water points is to be checked by the land manager during weekly inspections.	Signs of malfunction (leaks, faulty pumps, broken dam walls)	Water infrastructure is to be repaired as soon as practicable and within one month after each trigger occurs.
Active weed control is to be implemented whenever a new restricted invasive plant listed under the *Biosecurity Act 2014* (Qld) is detected within the offset area or when existing weeds occur in infestations that cover >10% of the offset area's ground surface.	When required, throughout the duration of offsets.	Land manager	Novel infestations of restricted invasive weeds are to be searched for along tracks during quarterly inspections of the offset area by the land manager. Total weed cover is measured at permanent monitoring locations every five years.	Restricted invasive plant cover >10% of the offset area's ground surface. A new restricted invasive plant listed under the *Biosecurity Act 2014* (Qld) is identified within the offset area	Upon being notified or becoming aware of new restricted invasive plant listed under the *Biosecurity Act 2014* (Qld) or restricted invasive plants occupying greater than 10% of the offset area, the land manager is to implement pest control measures within one month. These measures may include, and are not limited to: ▪ foliar spraying ▪ basal bark spraying ▪ stem injection ▪ cut stump ▪ cut and swab ▪ stem scraper ▪ wick applicators. Treatments are to be recorded in annual reports. Follow-up retreatment is to take place until further corrective actions are no longer triggered (the novel weed infestation has been eradicated or weed cover returns to <10%).
Rotational cattle grazing is to be implemented, whereby cattle are excluded from the offset area during the wet season (December to April) to allow grasses and forbs to flower and seed. Thereafter, cattle are to be introduced and remain within the offset area until vegetative groundcover is reduced to 20% (approximately 1,200 kg/ha), to provide	Throughout the duration of the offset.	Land manager	Land manager is to keep records of the stocking rate and stocking period each year. The Land manager is to estimate vegetative groundcover during regular inspections while cattle are present.	Habitat quality score for the Squatter Pigeon does not achieve interim performance targets.	A failure to achieve interim performance targets will trigger the following response: ▪ Step 1: consult the annual reports to determine compliance with the OAMP; ▪ Step 2: If failures occurred despite full compliance, the rotation program is to be amended according to the direction of the failure; longer periods of grazing and/or higher stocking rates are recommended in instances where grass cover is excessive for Squatter Pigeons,

Management Measure	Timing	Responsibility	Performance Monitoring	Performance Trigger	Corrective Actions
a favourable foraging substrate for Squatter Pigeons. Once vegetative groundcover is reduced to 20% and no rain is forecast in the coming week, cattle are to be removed from the offset area and not returned until the end of the following wet season.			The five-yearly monitoring includes measures of "perennial grass cover" and 'Squatter Pigeon foraging habitat score", which directly measure whether grazing intensity has been optimal for the Squatter Pigeon. Other habitat attributes measured during five-yearly monitoring (e.g., "species richness of grass and forbs" and "weed cover", should also improve or be maintained with appropriate grazing intensity.		while shorter periods of grazing and/or lower stocking rates are recommended in instances of insufficient grass cover.
Implement a pest control program that targets dogs, cats and pigs using a range of techniques including baiting, shooting and trapping. Participate fully in, and cooperate with, any and all regional pest control programs, except those that contravene a part of this OAMP.	Throughout the duration of the offset.	Land manager	A baseline survey involving 4 daylight hours + 4 night time hours during a single 24-hour period will be undertaken to determine the number of pest animals detected per survey. Similar 8-hour surveys will be undertaken quarterly to assess changes in the numbers of pest animals detected per survey.	Observed increase in the number of pest animals recorded per 8-hour survey above baseline levels and/or previous monitoring event (whichever is lower).	Observations of a large number of feral animals will trigger an increase in control effort expended until a resulting decline in feral animal numbers is observed and maintained. If triggers continue, the Pastoral Manager or Landholder is to approach neighbouring landowners to reach an agreement regarding the implementation of a larger-scale integrated pest control program, to slow recolonisation of the offset area.
Fire breaks are to be maintained around all external boundaries of the offset area. Fire control lines must be inspected quarterly. Maintenance must be undertaken as required and at least once every two years. If one or more bushfires are current in the region and considered potentially threatening to the site, coordinate with all relevant fire authorities to determine the appropriate method of protecting the site (if the relevant fire authorities advise against protecting the site from a specific fire, the approval holder may comply with that advice without needing approval or agreement from DAWE).	Throughout the duration of the offset.	Land manager	Occurrence of unplanned and uncontrolled fires within the offset area is to be monitored by the land manager quarterly.	Occurrence of an unplanned and uncontrolled fire within the offset area.	An uncontrolled fire will trigger the following response: ▪ Step 1: identify the source of the fire, and which fire breaks failed to contain it; ▪ Step 2: repair any damage to fencing and/or water trough infrastructure; ▪ Step 3: exclude cattle until the end of the following wet season to allow recovery and regeneration of vegetation; ▪ Step 4: Report the fire within the annual report; and ▪ Step 5: based on the damage to habitat quality attributes resulting from the fire, reassess the fuel load reduction practices and the width of fire breaks at the offset site.
Prescribed, controlled burns may be undertaken in some years to reduce overly dense regrowth of small trees and shrubs (when there is a density of >750 immature trees/ha). If required, such burns would involve cool fires lit during the months of June, July, August and September when wind speeds are less than 5km/h. Planned and controlled ecological burns are to be restricted to <25% of the offset area in any 12-month period. Cattle are to be removed prior to the fire and not returned until after the following wet season.	As required, but primarily within the first ten years of the offset.	Land manager	The timing of prescribed burns is to be recorded by the land manager, along with a map of each fire scar. The impact of fire on habitat quality attributes will be assessed as part of the five-yearly monitoring of the offset area.	>25% of the offset area burnt in any 12-month period. Scorch height of fires >5 m. Non-juvenile Koala food trees (>4 m tall) killed by fire.	A fire that is hotter or more extensive than planned will trigger: ▪ A review of the controlled burning practices (timing and wind conditions permissible); and ▪ An assessment of whether prolonged cattle exclusion (longer than one wet season) is required to facilitate tree regeneration.
In instances where controlled burns fail to thin dense regrowth of juvenile trees, thinning of Koala non-food tree saplings may be undertaken using chemical or mechanical means. Prior to any ecological thinning taking place, an ecologist with >15 years' experience in Central Queensland is to be consulted. The ecologist is to assess the pre-thinning habitat quality scores for the target area and determine limits on the number, species and size of trees to be removed in order that thinning does not cause long-term declines in habitat quality scores. Thinning can only be undertaken with the prior written agreement of DAWE.	As required, within the first five years of offsets.	Land manager	Five-yearly monitoring of habitat quality will track the improvements in tree growth rates achieved by thinning, as well as collateral impacts on other habitat attributes such as canopy cover.	Unapproved thinning. Thinning that results in a decline in habitat quality score that is likely to persist for longer than 10 years.	Unapproved thinning constitutes an incident reportable to the Australian Government consistent with any and all EPBC Act approvals. Approved thinning that results in a decline in habitat quality score within a trial area will trigger either the abandonment of the practice at larger scales within the offset area or further trials involving substantially revised practices. Any further trials are only to be undertaken with the prior written agreement of DAWE.

Management Measure	Timing	Responsibility	Performance Monitoring	Performance Trigger	Corrective Actions
Removal of regrowth within access tracks and fire management lines associated with fences. Construction and maintenance of access tracks, fencing and fire lines will be undertaken in accordance with the requirements of the VM Act. Any vegetation clearing required for fencing, access or fire lines must be undertaken in accordance with best practice management methods and any applicable legislative requirements (e.g., be less than 10 m wide).	When required, throughout the duration of offsets.	Land manager	Annual reports are to contain a description of all clearing activities undertaken within the offset area, and how this clearing accorded with this OAMP and the VM Act.	Clearing wider than 10 m for tracks, fences and fire management lines.	Unauthorised clearing (clearing not in accordance with this OAMP) constitutes an incident reportable to the Australian Government consistent with any and all EPBC Act approvals.
Implement monitoring and reporting program described in **Section 12.**	See **Section 12**	See **Section 9.1**	See **Section 12**	See **Section 6**	See **Section 12.3**

9.1 Roles and Responsibilities

The persons responsible for undertaking the tasks described in this OAMP are listed in **Table 16**.

Table 16 Roles and responsibilities

Person/position	Duties
Offset land manager	• Oversee compliance with the voluntary declaration under the VM Act; • Maintain fences, access tracks and fire breaks; • Manage rotation of cattle grazing; • Install, inspect and maintain dams, bores and troughs; • Maintain entry signage; • Undertake weed and pest animal monitoring and management; • Undertake control burns and/or thinning in accordance with this OAMP; • Undertake regular site inspections and make available all data gathered during these inspections to Vitrinite's Chief Operating Officer for annual reporting. • Contact Vitrinite's Chief Operating Officer in the event of becoming aware of a reportable incident.
Vitrinite's Chief Operating Officer	• Register the offset area with a voluntary declaration under the VM Act; • Arrange for signage to be prepared and installed; • Engage ecologists to undertake five-yearly monitoring of habitat quality; • Prepare and submit the Annual Offset Area Report to the Australian Government; and • Inform the Australian Government of reportable incidents.
Qualified ecological consultant	• Undertake five-yearly monitoring of habitat quality within the offset area.

9.2 Emergency Contact and Procedure

Table 15 lists corrective actions and processes to be undertaken to address various management triggers. In the event of a reportable incident, Vitrinite's Chief Operating Officer must contact DAWE (phone 1800 803 772) within 5 business days of becoming aware of the incident. The following are considered reportable incidents:

- A failure to register the offset within 12 months of approval of this OAMP;
- A failure to install all supplementary water sources within one year of approval of this OAMP;
- A force majeure event;
- Unapproved clearing within the offset area;
- A failure to achieve interim performance targets;
- A failure to submit an Annual Offset Report and/or an Offset Performance Report by the due date; and
- A failure to adhere to any other conditions of this OAMP or the EPBC Act approval.

10 Legal Obligations Without Offsets

Securing the offset area will increase protection for biodiversity values from clearing and provide management of grazing, fire, weeds and pest animals that are additional to current legal obligations.

The offset area is not protected from timber harvesting or the sowing of exotic pasture species by either the VM Act or the EPBC Act due to exemptions within the legislative frameworks for the continuing use of the land. Areas of remnant vegetation are protected from broad-scale clearing under the VM Act. However, clearing of areas mapped as category X on the regulated vegetation map is permitted. Likewise, clearing of remnant vegetation for the purposes of timber harvesting, reducing hazardous fuel loads, or for maintaining/constructing fences and tracks is permitted under the VM Act. For an assessment of risk of loss without offsets, refer to **Section 5.3.**

There are no pre-existing legislative requirements pertaining to fire management or grazing practices in the offset area, other than it being illegal to light fires during a local fire ban declared under the *Fire and Emergencies Act 1990* (Qld).

From 1 December 2021, graziers within the Fitzroy River catchment will be subject to minimum practice agricultural standards, including the need to take action to improve land condition and ground cover on areas of grazing land with less than 50% ground cover (cover of plants, litter, twigs and woody debris measured at 30 September each year). This OAMP goes above and beyond requiring a maximum of 50% bare ground by also prescribing optimal minimum amounts of bare ground and optimal cover of living plants that align with the habitat preferences of Squatter Pigeons.

There are minimal pre-existing obligations for weed and pest management under the *Biosecurity Act 2014* (Qld) and these relate only to species that are listed as prohibited or restricted under this act. All Queenslanders have a general biosecurity obligation under section 23 of the *Biosecurity Act 2014* to take all reasonable and practical measures to prevent or minimise the biosecurity risk. This obligation extends to preventing or minimising adverse effects of a declared weed or pest animal. Land holders must not do or omit to do something if the person knows or ought reasonably to know that doing or omitting to do the thing may exacerbate the adverse effects of a declared pest animal or weed.

In addition to these general biosecurity obligations, specific legal obligations pertain to certain restricted matters, depending on their classification under the *Biosecurity Act 2014* (**Table 17**).

Table 17 Obligations under the Biosecurity Act 2014

Category	What is required	Examples
1	Must report presence	Plant and animal diseases, feral ants
2	Must report presence	Noxious fish, certain weeds
3	Must not distribute, be traded or released into the environment	Most invasive weeds, pest animals, noxious fish
4	Must not move	All pest animals and noxious fish, certain weeds
5	Must not possess or keep	Wild dogs, rabbits, foxes, rabbits, certain noxious fish, certain weeds
6	Must not feed (except if undertaking a control program)	All pest animals, certain noxious fish
7	Must be killed and disposed of	Certain noxious fish

The obligations under this OAMP for suppressing weed and pest animal numbers below densities prescribed in **Table 15** are additional to the above obligations under the *Biosecurity Act 2014.*

The Isaac Regional Council identifies the offset area as Rural in its planning scheme and offers no protection from the current ongoing land use. The council has a draft Biosecurity Plan, but this plan does not place any additional onus on land holders than obligations under the *Biosecurity Act 2014*.

11 Legally Binding Mechanism

This offset will be secured via a voluntary declaration (**VDec**) as an area of high conservation value under the VM Act. Once this has been registered on the title, the offset area will be mapped as category A regulated vegetation on the property map of assessable vegetation. An area mapped as category A on a PMAV is described as an 'area subject to compliance notices, offsets and voluntary declarations'.

The approval holder will legally secure the environmental offset within 1 year from the date that the OAMP is approved in writing by the Minister. The approved OAMP must be attached to the legal mechanism used to legally secure the environmental offset. The approval holder will notify the Department within 5 business days of the mechanism to legally secure the environmental offset having been executed.

The VDec will remain in place as the legally securing mechanism for the offset area. The VDec and approved OAMP will ensure the offset completion criteria are attained, and then maintained for the period of the EPBC Act approval, or until otherwise advised by the Minister in writing. Statutory protection of the offset area is maintained under the VM Act, *Nature Conservation Act 1992* (Qld) and EPBC Act (or subsequent legislation).

12 Monitoring and Reporting

The monitoring program described in this section has two purposes:

1. To assess performance of the offset against interim performance targets and completion criteria; and
2. As a quality assurance/quality control that management measures are being undertaken in accordance with this OAMP.

The former identifies whether the offset is successful, while the latter helps identify potential causes of any failure.

12.1 Monitoring Methodology

The monitoring to be undertaken of the offset area is summarised in **Table 18** and described in further detail in the following subsections.

Table 18 Monitoring schedule

Attributes monitored	Timing	Method	Responsibility
Pasture cover, condition of water points.	Weekly	Site inspections (Section 12.1.1).	Land manager
Signage, condition of tracks, fences and fire breaks	Monthly	Site inspections (as per Section 12.1.1).	Land manager
Feral animals, weeds	Quarterly	As per Section 12.1.1.	Land manager
Habitat quality scores for the Koala and Squatter Pigeons.	Mar-May in 2026, 2031, 2036 and 2041.	As per the *Guide to determining terrestrial habitat quality version 1.3* (Section 12.1.2).	Ecologists contracted by Vitrinite

12.1.1 Regular Site Inspections

The land manager is to undertake regular inspections of the offset area, which involve driving along the major tracks and fence lines. The following are to be checked and noted during these inspections:

- Condition of entrance signs;
- Any indications of unauthorised access (damaged locks, tyre tracks, used camp sites);
- Direct observations or indirect signs (e.g., hoof prints around muddy dam edges) that cattle have intruded into the offset area during periods when they were to be excluded;
- Signs of recent fire;
- Condition of fire breaks;
- Condition of and presence of water within all troughs and dams; and
- Condition of pasture (estimation of percentage cover of vegetation under 1 m tall, litter, rock and bare ground), as assessed against the Brigalow Belt pasture photo standards (https://futurebeef.com.au/knowledge-centre/brigalow-belt-pasture-photo-standards).

Inspections are to be undertaken at least monthly; however, during certain periods (e.g., when pasture condition indicates that cattle are soon to be removed, or when water levels in dams are low), more regular inspections (weekly) may be necessary.

Pest animals are to be monitored quarterly, by spending four daylight hours and four night-time hours searching for feral animals within the offset area. The numbers of each species observed are to be

recorded for each round of monitoring, as a record of relative population size over time. Weeds are to be monitored concurrently for signs of any infestations of restricted weeds not previously known to occur within the offset area.

Records are to be kept after each inspection, and all records are to be used to prepare an Annual Offset Area Report (**Section 12.2.1**).

12.1.2 Five-yearly Monitoring of Habitat Quality

Detailed reassessments of habitat quality within the offset area are to be conducted every five years. These are the principal means of assessing the offset against the interim performance targets and completion criteria listed in **Section 6**.

It is important that habitat quality is assessed using identical methodology throughout the duration of the offset, and it is equally important that this methodology aligns with that used to assess habitat quality at the impact site. This methodology was developed for the VCP Environmental Offset Strategy, and has been replicated here for reference.

Habitat quality is to be monitored in the period March-May every five years after the approval of this OAMP. Monitoring is to be undertaken by qualified ecologists or botanists with experience in ecosystems of the Bowen Basin.

Monitoring is to be undertaken at the same 14 locations used for the initial offset area assessment (**Table 19; Figure 7**).

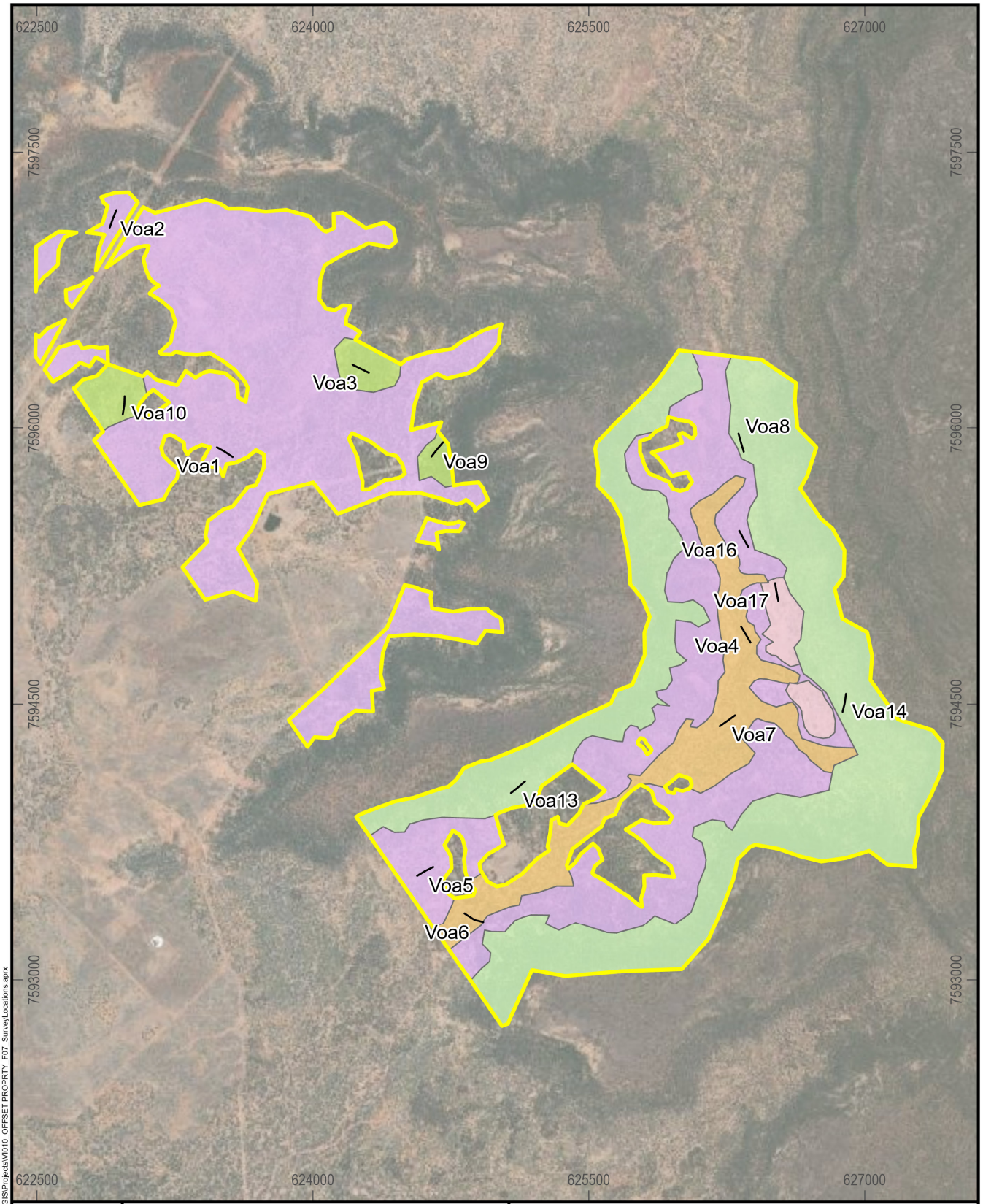
Habitat quality is to be assessed at all monitoring locations within the offset area every five years. In accordance with the *Guide to determining terrestrial habitat quality version 1.3* (DES 2020a), two approaches for assessing site-based attributes are to be adopted:

- BioCondition scores; and
- Specially tailored, species-specific, fauna habitat quality scores.

Both approaches are used to assess different aspects of habitat quality for listed species. These approaches are described in the following subsections.

Table 19 Locations of permanent monitoring sites

Assessment Unit	Size within offset area (ha)	Site No.	Location of transect midpoint	
			Easting	Northing
Habitat Quality Sites				
Remnant 11.3.4	65.0	VOA4	626355	7594876
		VOA6	624878	7593329
		VOA7	626252	7594408
Remnant 11.7.1	20.0	VOA3	624255	7596326
		VOA9	624676	7595884
		VOA10	622975	7596128
Remnant 11.7.6	240.5	VOA8	626328	7595918
		VOA13	625116	7594049
		VOA14	626892	7594507
Remnant 11.9.7	400.6	VOA1	623521	7595870
		VOA2	622912	7597138
		VOA5	624609	7593593
		VOA16	626342	7595396
Non-remnant 11.9.7	12.4	VOA17	626520	7595108



METSERVE
Mining & Energy Technical Services Pty Ltd

Legend

- Habitat quality transects
- Offset Area

Assessment Units

- 11.3.4
- 11.7.1
- 11.7.6
- 11.9.7
- Non-rem 11.9.7

Source: METServe, 2021; Maxar.

VULCAN COAL MINE

Monitoring Locations

0 0.25 0.5 1

Kilometers

Scale: 1:30,000 (A4)

15/11/2021

Datum: GDA94
Projection: MGA55

FIGURE 7

Path: S:\Projects\VI010_Vulcan_Complex_Project_Jupiter_section\ARCGIS\Projects\VI010_OFFSET PROPRTY_F07_SurveyLocations.aprx

BioCondition

BioCondition is assessed following the methodology prescribed by the *BioCondition Assessment Manual version 2.2* (DSITIA 2015). It is expected that later versions of this manual will be published in the course of the offset; however, to maintain consistency it is important that the methodology of version 2.2 is adopted throughout the period of the offset.

BioCondition uses quadrat sampling to generate measurements of native plant richness, recruitment, shrub and tree cover, native perennial grass cover, litter cover, amount of coarse woody debris, non-native plant cover, tree height and number of large trees. These measurements are compared to benchmarks published by the Queensland Herbarium (2021b), which are compiled from data from reference sites. The benchmarks used in the initial assessment that informed the starting quality at the offset site should be applied throughout the duration of the offset, regardless of whether these are updated by the Queensland Herbarium as additional data is gathered over the 20-year offset period. These benchmarks are listed in **Table 20**.

Table 20 BioCondition benchmarks (as published by the Queensland Herbarium 2021b) to be used to assess monitoring sites

Regional Ecosystem	Recruitment (%)	Non-native plant cover (%)	Tree species richness	Shrub species richness	Grass species richness	Forb species richness	Tree canopy height (m)	Tree subcanopy height (m)	Tree canopy cover (%)	Tree subcanopy cover (%)	Large tree threshold diameter (cm)		Number of large trees per ha		Shrub canopy cover (%)	Native perennial grass cover (%)	Litter ground cover (%)	Woody debris length (m/ha)
											Eucalypts	Non-eucalypts	Eucalypts	Non-eucalypts				
11.3.4	100	0	4	2	7	10	22	12	17	5	48	24	26	9	1	43	20	384
11.7.1	100	0	4	8	8	9	20	9	27	5	40	24	18	2	10	20	20	424
11.7.6	100	0	4	5	10	16	25	13	40	7	46	27	16	11	11	23	52	217
11.9.7	100	0	3	5	9	28	17	9	27	12	40	22	14	2	1	26	15	287

The scoring system prescribed by the *BioCondition Assessment Manual version 2.2* (DSITIA 2015) results in a score out of 80 for site-specific attributes, while the *Guide to determining terrestrial habitat quality version 1.3* (DES 2020a) requires that this score is out of 100. To achieve this conversion, the original score is multiplied by 1.25.

BioCondition forms 1/3 of the habitat quality score for the Squatter Pigeon, but is not relevant for the Koala. The remaining scores are generated using species habitat attributes described below.

Species Habitat Quality

In addition to BioCondition, which assesses the overall quality of the vegetation within the impact and offset sites, species-specific habitat attributes are also assessed at each sampling location. As prescribed by the *Guide to determining terrestrial habitat quality version 1.3* (DES 2020a), habitat attributes must include indicators for food availability, suitability for breeding and shelter, suitability for mobility and level of ongoing threats. These four habitat attributes are to have equal weighting when generating overall scores for habitat quality for any one species.

Based on a detailed literature reviewed undertaken within the VCP Environmental Offsets Strategy, a project-specific set of indicators and a scoring system were devised in order to assess habitat quality for the Koala and Squatter Pigeon (**Table 21**). Some of the species-specific habitat attributes overlapped with

the BioCondition assessment (e.g., number of large trees for the Koala, and understorey richness for the Squatter Pigeon). The following attributes are additional assessments undertaken at monitoring locations:

- Basal area per hectare of Koala food trees (*Eucalyptus tereticornis, Eucalyptus camaldulensis, Eucalyptus populnea and Eucalyptus crebra*) is assessed via 360° sweeps with a Bitterlich gauge at the 0 m, 50 m and 100 m marks of the transect used to assess canopy cover for BioCondition. The mean of the three estimates is used. This represents the amount of food available at the site for Koalas.
- Canopy cover (based on the vertical projection of crowns) of trees taller than 4 m (the minimum height likely to be used by Koalas) is assessed as for total canopy cover for BioCondition, except that only trees taller than 4 m are included in the estimate. This reflects the density of trees tall enough for Koalas to climb to escape predators.
- The presence/absence of at least one dense shade tree (at least 6 m tall with >75% foliage projective cover within the crown) within the 100 m × 50 m quadrat used for BioCondition is recorded. This indicates whether favourable shelter trees are available to Koalas at the site.
- The percentage cover of Buffel Grass is estimated by dividing the 50 m × 10 m quadrat used for BioCondition into 1/8s, visually estimating the percentage cover of Buffel Grass in each 1/8, then calculating the mean of the eight estimates. This reflects the threat posed by the weed on foraging habitat for the Squatter Pigeon.
- The percentage of bare ground is estimated at five 1 m × 1 m quadrats used for BioCondition, and the mean of the five estimates is calculated. Bare ground is an important feature of foraging habitat for the Squatter Pigeon.

In addition to these field-measured attributes, the following suite of spatial attributes are to be measured using GIS tools:

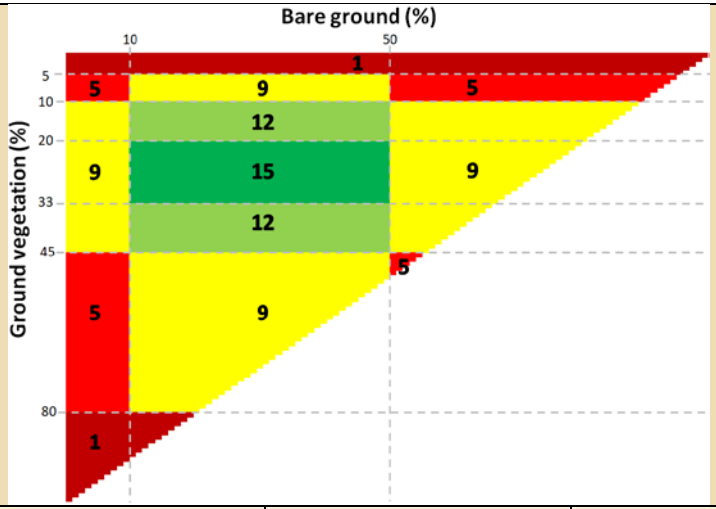
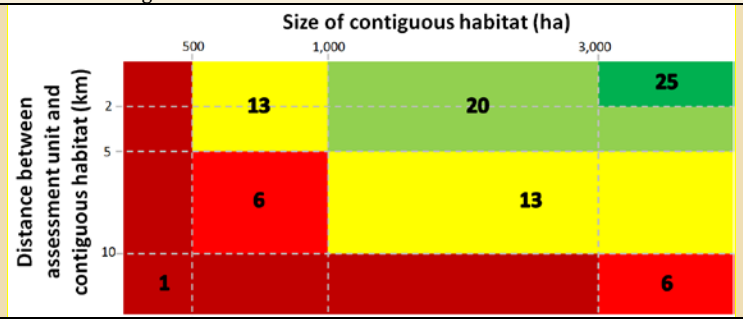
- distance from the assessment unit boundary to the nearest water source (refuge from drought for Koalas) and public road (vehicle threat to Koalas);
- size of the habitat patch connected to the assessment unit, and distance to large habitat patches; and
- the percentage of the assessment unit that comprises one-hectare cells with an NDVI > 0.125, when assessed in the dry season (a measure of the extent of woody vegetation cover for Squatter Pigeons).

The habitat quality score for the Koala is to be determined by the species-specific habitat quality scoring system described in **Table 21.** The habitat quality score of the Squatter Pigeon is a weighted average of the offset area's BioCondition score and the species-specific habitat quality score described in **Table 21** (with a weighting of 1:2).

Table 21 Species-specific habitat quality scoring system used for the Vulcan Complex impact site, and to be used for the offset area

<table>
<tr><td rowspan="11">Koala</td><td rowspan="5">1 Threats to species</td><td>Score</td><td>0</td><td>3</td><td>6</td><td>8</td></tr>
<tr><td>Risk of road-based mortality</td><td>High: Assessment unit borders a public road with 100 kph speed limit.</td><td>Moderate: Assessment unit is within 1 km of a public road with 100 kph speed limit, OR borders a public road with 60-100 kph speed limit.</td><td>Low: Assessment unit lies 1-2 km from public roads, AND any private tracks through or near the unit are used infrequently at night (less than once per week) and at low speeds (less than 50 kph).</td><td>Nil: Assessment unit lies >2 km from a public road, AND any private tracks through or near the unit are used infrequently at night (less than once per week) and at low speeds (less than 50 kph).</td></tr>
<tr><td>Score</td><td>0</td><td>5</td><td>8</td><td></td></tr>
<tr><td>Risk of dog attack</td><td>High: Assessment unit is within 18 km of a town, dump or other source of supplementary food for dogs, and no control programs are in place.</td><td>Moderate: Assessment unit is within 18 km of a town, dump or other source of supplementary food for dogs, but active control measures (baiting, trapping or shooting) occur within the assessment unit and effectively reduce dog densities (as shown by monitoring).</td><td>Low: Assessment unit is further than 18 km from a town, dump or other source of supplementary food for dogs.</td><td></td></tr>
<tr><td>Score</td><td>0</td><td>5</td><td>9</td><td></td></tr>
<tr><td>Importance as a drought refuge</td><td>Low: The assessment unit is further than 2 km from a watercourse or source of surface water, OR is 1-2 km from a watercourse, but no vegetation occurs along the watercourse.</td><td>Medium: The assessment unit is 1-2 km from a watercourse or source of surface water, and is connected to vegetation along the watercourse.</td><td>High: The assessment unit is within 1 km of a watercourse or source of surface water.</td><td></td></tr>
<tr><td rowspan="3">2 Quantity and quality of food</td><td>Score</td><td colspan="4">Scores are assigned based on combination of basal area and proportion of primary food trees, as shown in the below table</td></tr>
<tr><td>Density and quality of food trees</td><td colspan="4"><table>
<tr><td></td><td></td><td colspan="5">Percentage of total food tree basal area that comprises primary food trees (E. camaldulensis or E. tereticornis)</td></tr>
<tr><td></td><td></td><td>0</td><td><10</td><td>10-40</td><td>40-70</td><td>70-100</td></tr>
<tr><td rowspan="6">Combined basal area of all food trees (m²/ha)</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td><2</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>2-5</td><td>2</td><td>3</td><td>5</td><td>7</td><td>8</td></tr>
<tr><td>5-8</td><td>3</td><td>5</td><td>7</td><td>10</td><td>12</td></tr>
<tr><td>8-10</td><td>4</td><td>7</td><td>10</td><td>13</td><td>16</td></tr>
<tr><td>>10</td><td>5</td><td>8</td><td>12</td><td>16</td><td>20</td></tr>
</table></td></tr>
<tr><td>Score</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Number of large food trees</td><td>None: No large food trees</td><td>Poor: 1 or 2 large food trees per 0.5 ha</td><td>Moderate: 3 to 6 large food trees per 0.5 ha</td><td>High: 7 to 10 large food trees per 0.5 ha</td><td>Very high: >10 large food trees</td></tr>
<tr><td rowspan="2">3 Quality and availability</td><td>Score</td><td>1</td><td>2</td><td>4</td><td>7</td><td>10</td></tr>
<tr><td>Canopy cover of trees taller</td><td>None: No trees taller than 4 m.</td><td>Poor: <10% cover.</td><td>Moderate: 10-30% cover.</td><td>High: 30-60% cover.</td><td>Very high: >60% cover.</td></tr>
</table>

	of shelter	than 4 m.					
		Score	0	2	4	7	10
		Number of large non-food trees	0	1	2-4	5-10	>10
		Score	0	5			
		Presence of dense shade trees	Trees taller than 6 m and with a crown that has >75% cover are absent	Trees taller than 6 m and with a crown that has >75% cover are present			
	4 Species mobility capacity	Score	1	5	10	17	25
		Extent of contiguous habitat.	**Very poor:** Assessment unit is further than 5 km from contiguous habitat larger than 200 ha.	**Poor:** Assessment unit is 2-5 km from contiguous habitat larger than 200 ha	**Moderate:** Assessment unit is connected to, or within 2 km of, a contiguous landscape that is 200-500 ha.	**Good:** Assessment unit is within 2 km of a contiguous landscape that is 500-1,000 ha.	**Very good:** Assessment unit is connected to or within 2 km of a contiguous landscape that is >1,000 ha.
Squatter Pigeon	**1 Threats to species**	Score	1	6	11	16	
		Invasion by Buffel Grass	**High:** Buffel Grass has a ground cover >40%	**Moderate:** Buffel Grass has a ground cover of 10-40%.	**Low:** Buffel Grass has a ground cover of 0.1-9.9%.	**None:** Buffel Grass is absent.	
		Score	0	3	7	9	
		Predation by feral predators	**Very High:** Assessment unit is within 5 km of a town, dump or other source of supplementary food for dogs and cats, and no control programs are in place.	**High:** Assessment unit is within 18 km of a town, dump or other source of supplementary food for dogs, and no control programs are in place.	**Moderate:** Assessment unit is within 18 km of a town, dump or other source of supplementary food for dogs and cats, but active control measures (baiting, trapping or shooting) occur within the assessment unit and effectively reduce cat and dog densities (as shown by monitoring).	**Low:** Assessment unit is further than 18 km from a town, dump or other source of supplementary food for dogs and cats.	
	2 Quality and availability of food and	Score	**0**	**1**	*Unlike for other habitat attributes and species, the score for distance to water is multiplied by the sum of the other foraging scores to generate an overall foraging habitat score for Squatter Pigeons.		
		Distance to water*	**High:** Assessment unit is >3 km from water.	**Low:** Assessment unit is within 3 km of water.			
		Score	Scores (1-15) are assigned based on the percentage of ground covered by low vegetation (<1 m) and bare ground, as shown in the below table				

	foraging habitat	Ground cover					
		Score	**1**	**3**	**5**	**8**	**10**
		Understorey richness	**Very low:** <5 species of grasses and forbs.	**Low:** 5-14 species of grasses and forbs.	**Moderate:** 15-24 species of grasses and forbs.	**High:** 25-29 species of grasses and forbs.	**Very high:** >30 species of grasses and forbs.
	3 Quality and availability of habitat for shelter and breeding	Score	**0**	**1**	*Unlike for most other habitat attributes and species, the score for distance to water is multiplied by the other breeding habitat score below to generate an overall breeding habitat score for Squatter Pigeons.		
		Distance to water*	**High:** Assessment unit is >1 km from permanent water	**Low:** Assessment unit is within 1 km of permanent water.			
		Score	**1**	**4**	**11**	**18**	**25**
		Normalised Difference Vegetation Index (NDVI)	**Very poor:** the assessment unit does not contain any 1-ha cells with a mean NDVI > 0.125.	**Poor:** <30% of the assessment unit has NDVI > 0.125.	**Moderate:** 30-60% of the assessment unit has NDVI > 0.125.	**Good:** 60-80% of the assessment unit has NDVI > 0.125.	**Very good**: >80% of the assessment unit has NDVI > 0.125.
	4 Species mobility capacity	Score	Scores are assigned based on the below table				
		Extent of, and distance to, large patches of contiguous habitat					

12.2 Reporting

12.2.1 Annual Offset Area Report

An Annual Offset Area Report is to be prepared and submitted every 12 months from the date of the approval of this OAMP. The purpose of this Annual Offset Area Report is to describe the management actions undertaken during the year, and to document compliance with the EPBC Act approval. The Annual Offset Area Reports will provide transparency regarding how the site management actions are being implemented, and where relevant, identify any force majeure events impacting the offset site, and any non-compliance with the OAMP. In order to achieve this, all Annual Offset Area Reports must include the following contents:

- The dates that cattle were introduced to, and removed from, the offset area, and the number of head involved;
- The water levels within each constructed water source during each inspection, and any actions taken to repair leaks or other malfunctions;
- A description of any prescribed or uncontrolled fires that occurred within the offset area during the previous 12 months, including details about the date, location of the burn scar boundary, source of the fire, scorch height of the fire, and whether any trees taller than 4 m were killed as a result;
- The results of quarterly weed inspections and pest animal surveys
- The results of water point inspections and ground cover assessments;
- A description of all actions pertaining to weed control within the offset area during the previous 12 months, including the methods used, weeds targeted, and the timing, location and outcome of actions;
- A description of all actions pertaining to feral animal control within the offset area during the previous 12 months, including the methods used, pests targeted, and the timing, location and outcome of actions (e.g., number of animals killed);
- A description of any authorised and unauthorised clearing that took place within the offset area in the previous 12 months;
- A list of instances during the previous 12 months of cattle breaching the fencing surrounding the offset area, including those escaping from and intruding into the site, including the dates that fence repairs were undertaken; and
- A list of any reportable incidents that occurred during the previous 12 months.

In addition to the above, the first Annual Offset Area Report (to be submitted at the end of the first year) is to contain the following contents:

- The date that the offset area was registered with a voluntary declaration under the VM Act;
- The date that additional water sources were installed, with locations and photographs of each;
- The date that entrance signs were installed; and
- The baseline pest animal survey data

Every five years—the years in which interim performance criteria are monitored—the Annual Offset Area Report is to be accompanied by an Offset Performance Report (see below for details).

The Annual Offset Area Report is to be prepared by the land manager; alternatively, this can be prepared by the approval holder, or someone assigned by them, once provided with all relevant data and information from the land manager. The Annual Offset Area Report is to be submitted by the approval holder to the Australian Government.

12.2.2 Offset Performance Report

The results of the five-yearly monitoring of habitat quality of the offset site are to be reported in an Offset Performance Report, which will accompany the Annual Offset Area Report for the year in which monitoring is undertaken.

Each Offset Performance Report is to contain the following contents:

- A description of the methodology used to assess habitat quality, and how this accords with the methodology prescribed in this OAMP;
- A description of the timing of surveys and of recent weather conditions affecting plant growth;
- All raw data gathered at each monitoring site;
- A calculation of habitat quality scores for the Koala and Squatter Pigeon across the offset area;
- An assessment of how the habitat quality scores accord with the interim performance targets listed in **Section 6** of this OAMP;
- An indication of whether any additional risks/threats over and above those outlined in the final approved OAMP are apparent and management actions to be employed to manage those risks;
- If any triggers were detected and, if so, the corrective actions that were implemented and their outcomes; and
- Recommendations for improving/updating the OAMP in accordance with adaptive management.

The final Offset Performance Report, due 20 years after the approval of this OAMP, is to assess whether the entire offset has fully achieved and maintained all offset completion criteria listed in **Section 6** of this OAMP.

Offset Performance Reports are to be prepared by suitably qualified ecologists.

12.2.3 Reporting Schedule

The reporting schedule is listed in **Table 22**.

Table 22 Reporting Schedule

Report to DAWE	Reporting period	Submission due date
Annual Offset Area Report	1 November to 31 October each year	30 November each year
Offset Performance Report (an appendix to the Annual Offset Area Report)	1 March to 31 May in 2026, 2031, 2036 and 2041	30 November in 2026, 2031, 2036 and 2041

12.3 Failure to Achieve Performance Triggers

In the event that an Offset Performance Report reveals a failure of the offset to achieve the relevant interim performance triggers and completion criteria listed in **Section 6**, the following response is triggered:

Step 1: Investigate cause of failure:

- Within one month after detecting the failure, complete an investigation into the reasons why the interim performance targets or the completion criteria were not achieved in the specified timeframes. Specifically, compare the improvements/deteriorations in raw data for each habitat attribute with the changes projected by the literature review in **Table 10** and **Table 11**;
- Within two months after detecting the failure, complete a re-evaluation of the suitability of relevant management measures in the OAMP. This re-evaluation must identify appropriate corrective actions. Corrective actions may include, but are not limited to:
  - A third party review of the OAMP to provide input into the effectiveness of the management actions;

- Increasing the frequency, intensity or methods used for pest animal and weed control; or
- Modifying the grazing schedule or control burns to modify understorey structural attributes.

Step 2: Revise this OAMP to incorporate changes to management measures identified under step 1, and submit this revised plan to DAWE for approval;

Step 3: Implementation of corrective action(s):

- The appropriate corrective actions identified under Step 1 will be implemented as soon as practicable, and in any case within six months after detection of the trigger.

13 Revision of this OAMP

This OAMP is to be revised in the following situations:

- In the event of any failures to achieve interim performance triggers;
- Following force majeure events;
- In the event that offset habitat scores far exceed interim performance triggers to the extent that some management measures are superfluous to the objective of meeting interim performance triggers and offset completion criteria.

Revisions are to be undertaken in consultation with the Australian Government, and the revised OAMP is to be approved by the Australian Government prior to implementation.

14 List of Abbreviations

Abbreviation	Description
ARE	Agri & Environmental Solutions Pty Ltd
DAWE	Department of Agriculture, Water and the Environment
DES	Department of Environment and Science (Queensland)
DEWHA	Department of the Environment, Heritage, Water and the Arts (Commonwealth, former)
DNRME	Department of Natural Resources, Mines and Energy (Commonwealth, former)
DPIF	Department of Primary Industries and Fisheries (Queensland, former)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Commonwealth, former)
DSITIA	Department of Science, Information Technology, Innovation and the Arts (Queensland, former)
EA	Environmental authority
EOP	*EPBC Act Environmental Offsets Policy* (October 2012)
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999* (Commonwealth)
h	hour
ha	hectares
IBC	Intermediate bulk container
km	kilometres
kph	kilometres per hour
ML	Mining lease
MNES	Matters of national environmental significance
NDVI	Normalised Difference Vegetation Index
NRMMC	Natural Resource Management Ministerial Council
OAMP	Offset Area Management Plan
PMAV	Property map of assessable vegetation
RE	Regional ecosystem
SLATS	Statewide Landcover and Trees Study
TSSC	Threatened Species Scientific Committee
VCP	Vulcan Complex Project
VDec	Voluntary declaration
VM Act	*Vegetation Management Act 1999* (Queensland)

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SCHEDULE 1: TITLE SEARCH
ELLENSFIELD – L13 SP178466

Queensland Government

TITLES REGISTRY Current State Tenure Search

Department of Resources
ABN 59 020 847 551

Title Reference:	**17668014**	**Search Date:**	30/03/2021 07:31
Date State Tenure Created:	21/10/1995	**Request No:**	36764437
Creating Dealing:			

DESCRIPTION OF LAND

Tenure Reference: PH 30/897

Lease Type: ROLLING TERM LEASE

LOT 13 SURVEY PLAN 178466
Local Government: ISAAC

Area: 19450.000000 Ha. (SURVEYED)

No Land Description

No Forestry Entitlement Area

Purpose for which granted:
NO PURPOSE DEFINED

REGISTERED LESSEE

Dealing No: 720485021 21/12/2020

MALCOLM ROBERT BURSTON

TERM OF LEASE

Term and day of beginning of lease

Term: 30 years commencing on 01/10/1982

Expiring on 30/09/2012

Extended to 30/09/2062

CONDITIONS

A126 SPECIFIED CONDITIONS FOR: Term Lease
PURPOSE: Rolling term lease - Pastoral

STATUTORY CONDITIONS:

Statutory conditions are the general mandatory conditions of a lease and binds the lessee in accordance with Part 2 Division 1 of the Land Act.

1. Permitted Use: The lessee must use the land only for the purpose for which the tenure was issued under the Land Act 1994.
2. Duty of Care: The lessee has the responsibility for a duty of care, for the land under the Land Act 1994.
3. Rent/Instalment: The lessee must pay the annual rent/instalment in accordance with the Land Act 1994 and the Land Regulation 2009.
   For further information on how annual rent is determined, refer to the department's website at www.dnrm.qld.gov.au.
4. Noxious plants: The lessee must keep noxious plants on the land under control. If the lessee does not comply with this condition, the Minister may bring the noxious plants under control, the cost of which will be recovered from the lessee.
5. Information to Minister: The lessee must give the Minister administering the Land Act 1994, information the Minister asks for about the tenure.

Queensland Government

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Department of Resources
ABN 59 020 847 551

Title Reference: 17668014

CONDITIONS (Continued)

6. Monies for Improvements: No money for improvements is payable by the State on the forfeiture, surrender or expiry of this lease but money may be payable if the State receives payment from an incoming lessee or buyer for the improvements on the land. However, the previous lessee may apply to the Minister to remove the improvements that belong to the lessee, within a period of 3 months from the date of the forfeiture, surrender, or expiry of this lease. The lessee may only undertake the removal of the improvements in the presence of an authorised representative of the department, if required by the Minister. The lessee may only remove those improvements if all monies due from the lessee to the department under this lease have been paid.

REGULATORY-CONDITIONS:----------

A regulatory condition relates to a lease , in accordance with the Land Regulation.

1. Indemnity: The lessee indemnifies and agrees to keep indemnified the Minister, and the State of Queensland and its Representatives, (the "Indemnified parties") against all liability, costs, loss and expenses including claims in negligence (including any claims, proceedings or demands bought by any third party, and any legal fees, costs and disbursements on a solicitor and client basis) ("Claim") arising from or incurred in connection with:
   a. the granting of this lease to the lessee;
   b. the lessee 's use and occupation of the land; or
   c. personal injury (including sickness and death) or property damage or loss in connection with the performance (or attempted purported performance or non-performance) of the lease or a breach of the lease by the lessee .

   The lessee hereby releases and discharges to the full extent permitted by law, the Indemnified parties from all actions, claims, proceedings or demands and in respect of any loss, death, injury, illness or damage (whether personal or property and whether special, direct, indirect or consequential financial loss) arising out of the use and occupation of the lease. To the full extent permitted by law, the Minister, the State of Queensland and their Representatives will not be liable to the lessee for any special, indirect or consequential damages, including consequential financial loss arising out of the use and occupation of the lease.
2. Public Liability: The lessee must effect a public liability insurance policy with an insurer authorised under the Insurance Act 1973 (Commonwealth) or, if not so authorised then only with the Minister's approval, which can be given or withheld in the Minister's sole discretion, naming the lessee as the insured covering legal liability for any loss of, or damage to any property and for the injury (including death) to any person arising out of anything done or omitted on or about the land or any improvements thereon and against all claims, demands, proceedings, costs, charges, and expenses whatsoever (including claims in negligence) Such policy must:
   a. be for an amount of not less than $20,000,000.00 and have no per event sublimit or such higher amounts as the Minister may reasonably require.
   b. be effected on a "claims occurring" basis; and
   c. be maintained at all times during the currency of the lease, and upon receipt of any notice of cancellation, the lessee must immediately effect another public insurance policy in accordance with the terms of the lease .

Queensland Government

TITLES REGISTRY Current State Tenure Search

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Title Reference: 17668014

CONDITIONS (Continued)

The lessee must, as soon as practicable, inform the Minister, in writing, of the occurrence of any event that the lessee considers is likely to give rise to a claim under the policy of insurance effected and must ensure that the Minister is kept fully informed of subsequent actions and developments concerning the claim.
The lessee must renew such policy, at the lessee's expense, each year during the currency of this lease.
The condition will be satisfied if the lessee is the State of Queensland or a statutory authority eligible for cover under the Queensland Government Insurance Fund and is insured and continues to be insured by the Queensland Government Insurance Fund.
This condition will be satisfied if the lessee is the Commonwealth of Australia or a statutory authority eligible for cover under the Comcover Insurance Fund and is insured and continues to be insured by Comcover.

3. Access: The provision of access, further access or services to the land will not be the responsibility of the State.
4. Survey Costs: If the land needs to be surveyed or re-surveyed the lessee must do this at their own cost under the Survey and Mapping Infrastructure Act 2003. This survey plan must be lodged in the land registry within the specified time.
5. Extension: The lease is subject to the extensions of rolling term leases provision of the Land Act 1994 and the Minister must grant an extension of the term of a rolling term lease if the lessee makes an application in the approved form. The extension will be for the original term of the lease and may be given subject to condition changes.
6. Jurisdiction: The lessee is subject to the Land Act 1994 and all other relevant Queensland and Commonwealth legislation.
7. Compliance with Laws - the lessee must comply with all lawful requirements of the -
   a. Local Government; and
   b. any department within the Queensland or Commonwealth governments (including the department administering the Land Act 1994), local authority or statutory instrumentality having jurisdiction over the land, or the development, use and occupation of the land, in regard to its use, occupation and development of the land.

SPECIAL-CONDITIONS:----------

These conditions relate to this lease.
Improvements or development on or to the land

1. The lessee must during the whole term of the lease, to the satisfaction of the relevant authorities, maintain existing improvements and boundary fencing on the land in a good and substantial state of repair.

Quarry material

1. The lessee must allow any person authorised under the Forestry Act 1959 access to the leased land for the purpose of cutting and removing timber or removing other forest products, or quarry material, or other material from the leased land.
   Except as hereinafter provided the lessee must not interfere with any forest products or remove any quarry material (including any stone, gravel, sand, earth, soil, rock, guano or clay which is not a mineral within the meaning of the Mineral Resources Act 1989) or other material upon the leased land without the permission of the Minister administering the Land Act 1994 except under the authority of and in compliance in every respect with the requirements or a permit, licence, agreement or contract granted or made under the Forestry Act 1959.

Queensland Government

TITLES REGISTRY **Current State Tenure Search**

Department of Resources
ABN 59 020 847 551

Title Reference: 17668014

CONDITIONS (Continued)

ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Lease No. 17668014

2. EASEMENT No 602806083 (A1249) 30/05/1979
Burdening
THE LAND TO
QUEENSLAND ELECTRICITY COMMISSION
OVER
EASEMENT A ON GV149

3. TRANSFER No 706303084 24/01/2003 at 11:38
of
EASEMENT: 602806083 (A1249)
RESUMPTION EASEMENT: 602806087 (R1002)
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233

4. EASEMENT No 602806060 (A1278) 06/08/1979
EASEMENT IN PURSUANCE OF AN AGREEMENT DATED THE 20TH DAY OF SEPTEMBER, 1978 BETWEEN THE LESSEE OF THE WITHIN DESCRIBED HOLDING AND
QUEENSLAND ELECTRICITY COMMISSION
FOR PURPOSES AS DEFINED IN SUCH AGREEMENT.

5. TRANSFER No 706303027 24/01/2003 at 11:33
EASEMENT: 602806060 (A1278)
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233

6. RESUMPTION EASEMENT No 602806061 (R1016) 15/08/1986
EASEMENT PURSUANT TO PROCLAMATION DATED 10TH JULY 1986 UNDER SECTION 306 OF THE LAND ACT 1962-1986 OVER AN AREA OF 26.71 HECTARES AS SHOWN AS EASEMENT B ON PLAN GV277 DEPOSITED IN THE DEPARTMENT OF MAPPING AND SURVEYING FOR THE PURPOSE OF ELECTRICAL WORKS (TRANSMISSION LINE) IS HEREBY RESUMED AND SHALL VEST IN THE
QUEENSLAND ELECTRICITY COMMISSION
AS FROM 12TH JULY 1986

7. TRANSFER No 703437134 07/07/1999 at 08:08
RESUMPTION EASEMENT: 602806061 (R1016)
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233

8. RESUMPTION EASEMENT No 602806087 (R1002) 15/08/1986
Burdening
THE LAND TO
QUEENSLAND ELECTRICITY COMMISSION
OVER
EASEMENT C ON GV278

9. TRANSFER No 707365377 09/01/2004 at 09:25
RESUMPTION EASEMENT: 602806087 (R1002)
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233

Queensland Government

TITLES REGISTRY **Current State Tenure Search**

Department of Resources
ABN 59 020 847 551

Title Reference: 17668014

ENCUMBRANCES AND INTERESTS (Continued)

10. EASEMENT IN GROSS No 711365466 22/01/2008 at 16:21
burdening the land
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
over
EASEMENT D ON SP184906

11. EASEMENT IN GROSS No 711663868 21/05/2008 at 15:49
burdening the land
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
over
EASEMENT E ON SP184908

12. AMENDMENT OF LEASE CONDITIONS No 715985248 01/09/2014 at 05:00
THE CONDITIONS OF THE WITHIN TENURE ARE HEREBY AMENDED.

13. MORTGAGE No 720485022 21/12/2020 at 13:27
WESTPAC BANKING CORPORATION A.C.N. 007 457 141

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
715967862	ADMIN NOTING SEE DEALING FOR RELEVANT LEGISLATION	22/08/2014 09:09	CURRENT
716709063	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	24/08/2015 16:13	CURRENT
717803142	NT DETERM NATIVE TITLE ACT 1993 (CTH)	27/01/2017 14:34	CURRENT
717918843	CON COM AGMT MINERAL AND ENERGY RESOURCES (COMMON PROVISIONS) ACT 2014	24/03/2017 10:32	CURRENT
719767646	EXEMPT CONS SEC 322AA LAND ACT 1994	02/12/2019 08:28	CURRENT
720346248	CON COM AGMT MINERAL AND ENERGY RESOURCES (COMMON PROVISIONS) ACT 2014	22/10/2020 15:14	CURRENT

UNREGISTERED DEALINGS

NIL

Caution - Charges do not necessarily appear in order of priority

** End of Current State Tenure Search **

Information provided under section 34 Land Title Act (1994) or section 281 Land Act (1994)

Requested by: D-ENQ PROPERTY & TITLE SEARCH

www.qld.gov.au/titles
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SCHEDULE 2:
OFFSET ASSESSMENT GUIDE OUTPUTS

Table 2-1 Offset Assessment Guide output for the Koala

IMPACT SITE				OFFSET SITE													
Habitat cleared at Vulcan Complex Project	Area	203.5	Hectares	Time over which loss averted	20	start area (ha)	738.6	Risk of loss without offset (%)	8.9	Risk of loss with offset	0	65.74	80	52.588	50.524	82.031	100.775
	Quality	4	Scale 0-10					Future area without offset (adjusted ha)	672.86	Future area with offset (adjusted ha)	738.6						
	Total quantum of impact	81.4	Adjusted hectares	Time until ecological benefit	20	start quality	5	Future quality without offset	5	Future quality with offset	6	1	80	0.800	0.769		
Description	**Quantum of impact**		**Units**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw Gain**	**Confidence (%)**	**Adjusted gain**	**Net present value**		**% of impact**

Table 2-2 Offset Assessment Guide output for Squatter Pigeon foraging habitat

IMPACT SITE				OFFSET SITE													
Habitat cleared at Vulcan Complex Project	Area	209.8	Hectares	Time over which loss averted	20	start area (ha)	738.6	Risk of loss without offset (%)	8.9	Risk of loss with offset	0	65.74	80	52.588	50.524	143.852	114.277
	Quality	6	Scale 0-10					Future area without offset (adjusted ha)	672.86	Future area with offset (adjusted ha)	738.6						
	Total quantum of impact	125.88	Adjusted hectares	Time until ecological benefit	20	start quality	6	Future quality without offset	6	Future quality with offset	8	2	80	1.600	1.537		
Description	**Quantum of impact**		**Units**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw Gain**	**Confidence (%)**	**Adjusted gain**	**Net present value**		**% of impact**

Table 2-3 Offset Assessment Guide output for Squatter Pigeon breeding habitat

IMPACT SITE				OFFSET SITE													
Habitat cleared at Vulcan Complex Project	Area	170	Hectares	Time over which loss averted	20	start area (ha)	697.5	Risk of loss without offset (%)	8.9	Risk of loss with offset	0	62.08	80	49.662	47.713	135.847	133.184
	Quality	6	Scale 0-10					Future area without offset (adjusted ha)	635.42	Future area with offset (adjusted ha)	697.5						
	Total quantum of impact	102	Adjusted hectares	Time until ecological benefit	20	start quality	6	Future quality without offset	6	Future quality with offset	8	2	80	1.600	1.537		
Description	**Quantum of impact**		**Units**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw Gain**	**Confidence (%)**	**Adjusted gain**	**Net present value**		**% of impact**

SCHEDULE 3:
BASELINE HABITAT QUALITY DATA FOR THE OFFSET AREA

Table3-1 BioCondition attributes at each survey site in July 2021*

Site	Assessment Unit	Native Plant Richness				Tree canopy cover (%)	Sub-canopy cover (%)	Shrub cover (%)	Tree Height (m)	Native perennial grass cover (%)	Recruitment of canopy species (%)	Organic Litter Cover (%)	Large trees per ha		Coarse Woody Debris (m/ha)	Non-native plant cover (%)
		Trees	Shrubs	Grasses	Forbs								Eucalypts	Non-eucalypts		
VOA1	11.9.7	9 3	8 5	6 9	8 28	6.2 27	5.1 12	7.9 1	13.2 17	14.4 26	50 100	6.6 15	4 14	2 2	46 287	70.3 0
VOA2	11.9.7	6 3	5 5	5 9	6 28	22.4 27	2.9 12	2.5 1	12.8 17	14 26	33 100	10 15	0 14	0 2	274 287	72.4 0
VOA5	11.9.7	8 3	5 5	5 9	5 28	12.4 27	13.7 12	7.1 1	13.8 17	13 26	50 100	11 15	0 14	0 2	0 287	76.4 0
VOA16	11.9.7	9 3	6 5	10 9	9 28	17 27	20.6 12	10.3 1	15.5 17	23 26	33 100	15 15	4 14	0 2	287 287	45.5 0
VOA17	11.9.7 NR	8 3	4 5	5 9	7 28	0 27	0 12	3.5 1	8.6 17	2 26	0 100	20 15	0 14	0 2	0 287	96.3 0
VOA8	11.7.6	9 4	4 5	4 10	5 16	12.1 40	13.8 7	5.2 11	19.6 25	16 23	33 100	15 52	2 16	0 11	203 217	14.1 0
VOA13	11.7.6	24 4	9 5	8 10	9 16	31.1 40	13.8 7	5.4 11	12.5 25	17 23	100 100	18 52	12 16	0 11	38 217	22.7 0
VOA14	11.7.6	10 4	5 5	9 10	10 16	23.3 40	6 7	9.6 11	12.5 25	18 23	33 100	13 52	12 16	0 11	159 217	24.1 0
VOA3	11.7.1	16 4	12 8	13 8	15 9	27.8 27	19.6 5	38.8 10	24.5 20	13 20	25 100	9 20	16 18	12 2	457 424	48.3 0
VOA9	11.7.1	10 4	5 8	7 8	11 9	33.4 27	27.8 5	32.7 10	21.4 20	5 20	0 100	24 20	16 18	0 2	231 424	28.2 0
VOA10	11.7.1	7 4	7 8	6 8	7 9	16.4 27	19.1 5	25.6 10	18 20	13 20	50 100	10 20	14 18	0 2	450 424	66.7 0
VOA4	11.3.4	9 4	7 2	10 7	10 10	55.4 17	11.7 5	3.2 1	16.8 22	12 43	0 100	10 20	2 26	0 9	123 384	71.2 0
VOA6	11.3.4	14 4	7 2	3 7	7 10	19.7 17	13.9 5	26 1	21.6 22	2 43	25 100	33 20	12 26	4 9	235 384	84.7 0
VOA7	11.3.4	11 4	4 2	5 7	7 10	20 17	11 5	13.2 1	18.6 22	1 43	33 100	16 20	2 26	8 9	9 384	6.3 0

*Blue values indicate the raw measurements per site collected by ARE in July 2021, while the red values indicate the published BioCondition benchmarks against which the scores were assessed.

*Table3-2 Species-specific habitat attributes at each site in July 2021**

Site	Assessment Unit	Basal area of Koala food trees (m^2/ha)			Number of large food trees per 0.5 ha	Presence of dense shade trees	Number of large non-food trees	Foliage cover of trees >4 m tall (%)	Distance to a public road†	Distance to nearest supple-mentary food for feral predators (km) †	Distance to surface water (km)	Percentage ground cover			Percent of unit NDVI > 0.125	Size of contiguous habitat (ha)	Distance to contig-uous habitat (km)
		E. crebra	*E. populnea*	*E. tereticornis*								Buffel grass (%)	Vegetation (%)	Bare ground (%)			
VOA1	11.9.7	0	7.3	0	2	Yes	1	11.0	15.5	11.8	0.4	24.6	65.4	28	100	>100,000	0
VOA2	11.9.7	0	11	0	0	Yes	0	24.7	14.5	10.6	1.8	29	58	32	100	>100,000	0
VOA5	11.9.7	1	5	0	0	Yes	0	24.4	17.5	14.1	0.3	11.5	72	17	100	>100,000	0
VOA16	11.9.7	2	5.3	0	2	Yes	0	34.1	18.3	12.5	2.2	6.6	55	29	100	>100,000	0
VOA17	11.9.7 NR	1	1	0	0	Yes	0	<1	18.6	12.8	2.1	10.8	54	24	100	>100,000	0
VOA8	11.7.6	3.3	0	0	1	Yes	0	24.2	18.1	12	2.5	9.5	64	21	100	>100,000	0
VOA13	11.7.6	6	0	0	6	Yes	0	40.6	17.8	13.7	0.4	0.4	22	14	100	>100,000	0
VOA14	11.7.6	6.3	0	0	6	Yes	0	27.9	19.2	13.5	2.1	0.3	29	28	100	>100,000	0
VOA3	11.7.1	1	0	0	8	Yes	6	42.0	16.1	11.4	0.9	5.8	29	19	100	>100,000	0
VOA9	11.7.1	1.7	0.3	0	8	Yes	0	51.9	16.6	11.8	0.9	0.8	39	10	100	>100,000	0
VOA10	11.7.1	0.3	0	0	7	Yes	0	32.4	14.9	11.7	1.0	7.2	48	38	100	>100,000	0
VOA4	11.3.4	2.3	7.3	1	1	Yes	0	60.6	18.5	13	1.8	3.6	52	38	100	>100,000	0
VOA6	11.3.4	0	0.3	5.3	6	Yes	2	30.9	17.9	14.4	0.2	8.9	59	8	100	>100,000	0
VOA7	11.3.4	1.7	1.3	4	1	Yes	4	28.8	18.7	13.5	1.5	1.7	64	20	100	>100,000	0

*Data collected by ARE.

†The nearest public road is Red Hill Road. The nearest supplementary food source is the Burton Mine Camp.

Table3-3 Site photos taken of monitoring locations in July 2021(provided by ARE)

Site	Site Photo	Typical ground view
VOA1		
VOA2		
VOA3		

Site	Site Photo	Typical ground view
VOA4		
VOA5		
VOA6		

Site	Site Photo	Typical ground view
VOA7		
VOA8		
VOA9		

Site	Site Photo	Typical ground view
VOA10		
VOA13		
VOA14		

Site	Site Photo	Typical ground view
VOA16		
VOA17