BHP

Spring to Phillips Creek Diversion Project Offset Area Management Plan

Tay-Glen Property

15 February 2021

Document tracking	
Project Name	Saraji Mine Creek Diversion EPBC Act and offsets project
Company	Eco Logical Australia and v6/7&8 amendments by BHP
Project Number	20BRI-15276
Project Manager	Jessie McCudden
Prepared by	Jessie McCudden and v6/7&8 amendments by BHP
Reviewed by	Ailsa Kerswell and Mark Longbottom / BHP
Approved by	Ailsa Kerswell and Mark Longbottom / BHP
Status	Final
Version Number	9

This report should be cited as 'Eco Logical Australia 2021. Spring to Phillips Creek Diversion Project Offset Area Management Plan – Tay-Glen Property. Prepared for BHP.'

Contents

1. Introduction

1.1 Background

The Spring to Phillips Creek Diversion and associated works (the Project) is located at Saraji Mine (SRM), approximately 50 kilometres (km) southeast of Moranbah in Central Queensland on Mining Lease (ML) 1782, ML 2410, ML 70142, and ML 70294. BM Alliance Coal Operations Pty Ltd (BMA) owns and operates SRM, which operates under the Environmental Authority (EA) EPML00862313.

The Project will improve water management at SRM through more effective separation of clean water and mine affected water; rectifying historical design issues with the existing Southern Creek diversion; and delivering a post-mining landform that is safe, stable and non-polluting. The Project involves the construction of the diversion and supporting infrastructure at SRM.

The Project is approved under the *Environmental Protection and Biodiversity Act 1999* (EPBC Act), (EPBC 2019/8576). The delivery of offsets is required to address unavoidable impacts on Matters of National Environmental Significance (MNES) associated with the Project. This document comprises an Offset Area Management Plan (OAMP) prepared to address the offset requirement.

The significant residual impacts that are likely to result from the Project will be offset across one property, Tay-Glen. Tay-Glen is under freehold tenure owned by the Central Queensland Coal Associate Joint Venture Partners, which is a 50/50 joint venture between BHP Coal and Mitsubishi (the proponent and approval holder). The Tay-Glen offset site is located directly adjacent to the Project disturbance area and provides a refuge for individuals that may be directly impacted by the Project. It is 857.6 hectares (ha) in size.

1.2 Commonwealth offset conditions

The Commonwealth approval EPBC 2019/8576 (EPBC Act approval) outlines the approved unavoidable impacts as a result of the Project, which includes impacts to Koala (*Phascolarctus cinereus)*. The authorised impact areas for each MNES as per Condition 2 of the EPBC Act approval and associated offset commitment are outlined in Table 1.

Table 1: EPBC Act approved unavoidable impacts for the Project

MNES	Approved impact	Offset commitment
Koala habitat	74ha	Shown in Figure 1

Note: Assessment of the extent of significant impact to the koala was undertaken and reported in the approval submission. The Department of Agriculture, Water and the Environment (DAWE) determined the extent of significant impact to differ from the assessment outcome and this OAMP has been completed in accordance with the DAWE requirement for an approved impact extent of 74ha to Koala habitat.

1.3 Purpose & content of this OAMP

This OAMP has been prepared to address the Project's likely residual significant impacts to MNES identified in the preliminary documentation, as well as satisfy the EPBC Act approval offset conditions. It specifically focusses on the offsets provided at the Tay-Glen property, fulfilling the offset requirements for significant residual impacts to Koala habitat. The plan outlines the on-ground management of the Project's offset area to assist in the delivery of positive environmental outcomes.

The OAMP must provide certain content, as specifed by the DAWE. These requirements are detailed in Table 2 below, along with a cross-reference to where the relevant information is provided.

Table 2: Overview of this OAMP's content

Requirement	Information location
Details to demonstrate how the environmental offset/s compensate 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 Offsets Policy and all requirements of the Offsets Assessment Guide (OAG)	Offsets have been developed in accordance with both the EPBC Act Offsets Policy and the OAG. Details are provided in the Spring to Phillips Creek Diversion Project Offsets Strategy (Eco Logical Australia 2020a), Section 3 and Appendix B.
A description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses	See Section 2.
Baseline data and other supporting evidence that documents the presence of the relevant listed threatened species and communities, and the quality of their habitat within the offset area/s	Two dedicated ecology surveys were undertaken to determine the values and their baseline condition at the Tay-Glen offset site in May and December 2020. Refer to Appendix A of the Spring to Phillips Creek Diversion Project Offsets Strategy (Eco Logical Australia 2020a).
An assessment of the site habitat quality for the offset area/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 revision	The site habitat quality of the offset area was determined during field assessments in line with the Queensland Guide to determining terrestrial habitat quality (DES, 2020). Refer to Appendix B of Eco Logical Australia 2020a and Appendix B of this document.
Details of how the offset area/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	See Section 2.4.
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)	See Figure 1 and 2. Shapefiles are provided directly to the DAWE
Specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20 year period	See Table 5.
Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria	See Table 7.
Interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria	See Table 5.

Requirement	Information location
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 offset area/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions)	See Section 3.6.
Proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved	See Section 4.2.
Timing for the implementation of corrective actions if monitoring activities indicate the interim milestones have not been achieved	See Table 9.
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	See summary of risks in Table 6 and Appendix A.
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	See Table 4.
Details of the legal mechanism for legally securing the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation	The offset will be secured via a Voluntary Declaration under the Queensland *Vegetation Management Act 1999*. See Section 3.5.3.

2. Tay-Glen Property Offset Area

2.1 Property location and regional context

The Tay-Glen offset area is located in Isaac Regional Council Local Government Area in central Queensland, approximately 15 km north of Dysart and in proximity to SRM (Figure 1). The offset area is located within the larger Tay-Glen property, which extends to the north and south-east, adjacent to the mine and is adjacent to the disturbance area.

The Tay-Glen property contains a mixture of remnant and regrowth vegetation, with large cleared areas across the property, particularly in the southern portion. The offset area is located within the north-western parts of the Tay-Glen property, where vegetation clearing has been less widespread.

In the regional context, the offset area is located in the lowland areas of a much larger contiguous area of remnant vegetation associated with ridgelines running in an approximately southeast–northwest direction between Tieri and Moranbah, to the west of the Dysart-Middlemount Road.

The location of the Tay-Glen offset property is shown on Figure 1.

2.2 Tenure and ownership

The Tay-Glen offset area is sited within Lot 101 SP310393. The land is under freehold tenure owned by the Central Queensland Coal Associate Joint Venture Partners, which is a 50/50 joint venture between BHP Coal and Mitsubishi.

Figure 1: Tay-Glen Property offset area

2.3 Offset area and values

The offset area is located within the north-western parts of Lot 101 SP310393. There are currently no mining or petroleum leases over the area. Two MLs held by BMA (ML70142 and ML 70294) are located directly to the east of Tay-Glen. A buffer zone of 100 metres (m) has been designated between these MLs and the offset area to minimise the potential effects of disturbance related to mining activities within the offset. The same 100 m buffer has been applied to Lake Vermont Road and the Goonyella System Rail-line (refer to Figure 1).

The offset area is 857.6 ha in total area, with 650.2 ha vegetated (631.7 ha remnant; 18.5 ha regrowth) and 207.4 ha cleared areas.

Field surveys, involving targeted habitat assessments, ground-truthed 568.1 ha of Koala habitat within the offset area (Figure 2). This includes 549.6 ha of remnant vegetation and 18.5 ha of high value regrowth and regrowth vegetation. Habitat areas were validated based on the presence of preferred habitat structure and preferred food tree species that are the species habitat requirements outlined in the EPBC Act referral guidelines for the vulnerable Koala (DoE, 2014). Koala surveys were carried out in December 2020, which confirmed the presence of six Koala and two scat samples within the offset area. The offset area is directly adjacent to the disturbance area, forming habitat connectivity through remnant vegetation and riparian corridor of Phillips Creek. Surveys conducted in 2018 confirmed the presence of 18 Koala within habitat connected to the offset area.

The DAWE referral guideline also describes refuge habitat for the species, which was utilised to identify potential habitat refuges for the species within the offset area. Refuge habitat is suitable habitat in riparian environments and other areas with reliable soil moisture and fertility, including a permanent aquifer, in a riparian zone, on upper or mid-slopes, on a fertile alluvial plain or where soil moisture / rainfall is reliable (DoE, 2014).

Refuge habitat for Koala within the offset area was identified as riparian and floodplain open forests and woodlands in association with Phillips Creek in the south and two smaller tributaries in the centre of the offset area. This habitat was identified as vegetation analogous to RE11.3.25, RE11.3.2 and RE11.3.4 and occurs within an area of 80.2 ha. This vegetation has reliable year-round access to high soil moisture and provides an important refuge for Koala during droughts and in periods of extreme heat. Foraging and dispersal habitat for Koala within the study area was ground-truthed as eucalypt woodlands predominantly on sand plains and coarse-grained sedimentary rocks, with vegetation analogous to RE11.4.13, RE11.5.3, RE11.5.9, RE11.8.5 and RE11.10.7. This habitat occurs within an area of 487.9 ha.

Habitat within the offset area is analogous to that of the impact area. Habitat within the impact area was ground-truthed as riparian forests and eucalypt woodlands on floodplains, sandplains and sandstone uplands (RE11.3.25, 11.3.4, 11.5.3, 11.5.9, 11.10.1), which are dominated by known food trees such as Queensland Blue Gum, River Red Gum, Poplar Box and Narrow-leaved Ironbark (Eco Logical Australia 2020b).

Remnant Koala habitat within the study area was found to have structural complexity, canopy species diversity and recruitment characteristics resembling an undisturbed community. Regrowth habitat within the study area was found to have reduced canopy species richness, height and cover relative to an undisturbed community.

Koala have been recorded within the offset area and in connecting habitat across two surveys. Surveys conducted in December 2020 encountered six Koala (including one joey) within the offset area, whilst 18 individuals were recorded during surveys in 2018 in habitat directly adjacent and connected to the offset area. Surveys conducted within the offset area sighted five adults and one joey, within a broad range of habitat types including dry eucalypt woodlands, floodplain forests to woodlands and riparian woodlands. Surveys in 2018 observed 13 adults (male and female) and five joeys, the majority of which were identified within woodlands on alluvial and sand plains in the centre of the Project area (refer to Figure 2).

The offset area and adjacent connecting habitat are well utilised by Koala with a healthy breeding population observed across two surveys. The area is connected through remnant eucalypt vegetation which extends further west from the offset area and through riparian corridors, such as Phillips Creek. This allows Koala to move freely from adjacent habitat near SRM into suitable habitat areas within the offset area and beyond, reducing any potential overstocking issues. Available records (Atlas of Living Australia accessed 2020) show that Koala utilise areas further west, with records approximately 15 km west and 5 km north-west of the offset area (Figure 3). The offset area and surrounding suitable habitat are therefore considered important in maintaining the regional Koala population.

2.4 Landscape connectivity

Remnant vegetation within the offset area forms a large contiguous patch and joins the Phillips Creek riparian corridor in the south of the offset area, providing good connectivity within the offset area. In particular, the offset area is directly connected to Koala habitat within the Project's impact area, where Koala have been recorded at distances of less than 1 km from the offset area. Connectivity between the impact area and offsets area is shown on Figure 3.

Phillips Creek, which intersects the study area in the south, provides significant regional connectivity, linking the study area to large contiguous tracts of vegetation extending to the north, south and west. Saraji Road and rail line to the south-west, SRM and clearing for agricultural purposes limit connectivity in the area to the east.

2.5 Threatening processes

Field assessment of the offset area identified numerous threatening processes present within the property. These include habitat clearing, livestock grazing, pest fauna and weeds. A summary of the key threats to protected matter is provided in Table 3.

Table 3: Threatening processes for MNES values identified across the Tay-Glen property

MNES	Threat
Koala	• Clearing of regrowth habitat • Clearing of remnant habitat not currenty mapped as regulated vegetation by the Queensland Government • Clearing of understorey and recruitment trees • Impacts from grazing including trampling and over-grazing of regenerating native vegetation • Ongoing pest incursion • Potential predation of Koala by pest species in particular dogs and foxes • Fragmentation of habitat by infrastructure such as roads, fencelines, fire breaks etc.

Cattle grazing currently occurs across the offset area. Cattle grazing impacts, including low ground layer species diversity and pugging in wet areas, are evident across the offset area and considered to be moderate.

Numerous pest species are likely to occur within the offset area, including Rabbits *(Oryctolagus cuniculus*), Pigs (*Sus scrofa*) and Cats (*Felis catus*). Cane Toads (*Rhinella marina*) and Dogs (*Canis lupus familiaris*). These species are also common within the region.

Four flora species listed as restricted matter under the Queensland Biosecurity Act 2014 and as WoNS, were recorded within the offset area:

- Prickly pear (*Opuntia stricta*) Scattered across the offset area in low abundance usually observed as individual plants.

- Velvety tree pear (*Opuntia tomentosa*) Scattered across the study area in low abundance usually observed as individual plants.
- Rubber vine (*Cryptostegia grandiflora*) Scattered across the study area in associated with riparian or alluvial floodplains in low densities.
- Parthenium (*Parthenium hysterophorus*) Observed in varying density throughout the study area, though often in high density when associated creeks

Figure 2: Koala habitat across the Tay-Glen offset area

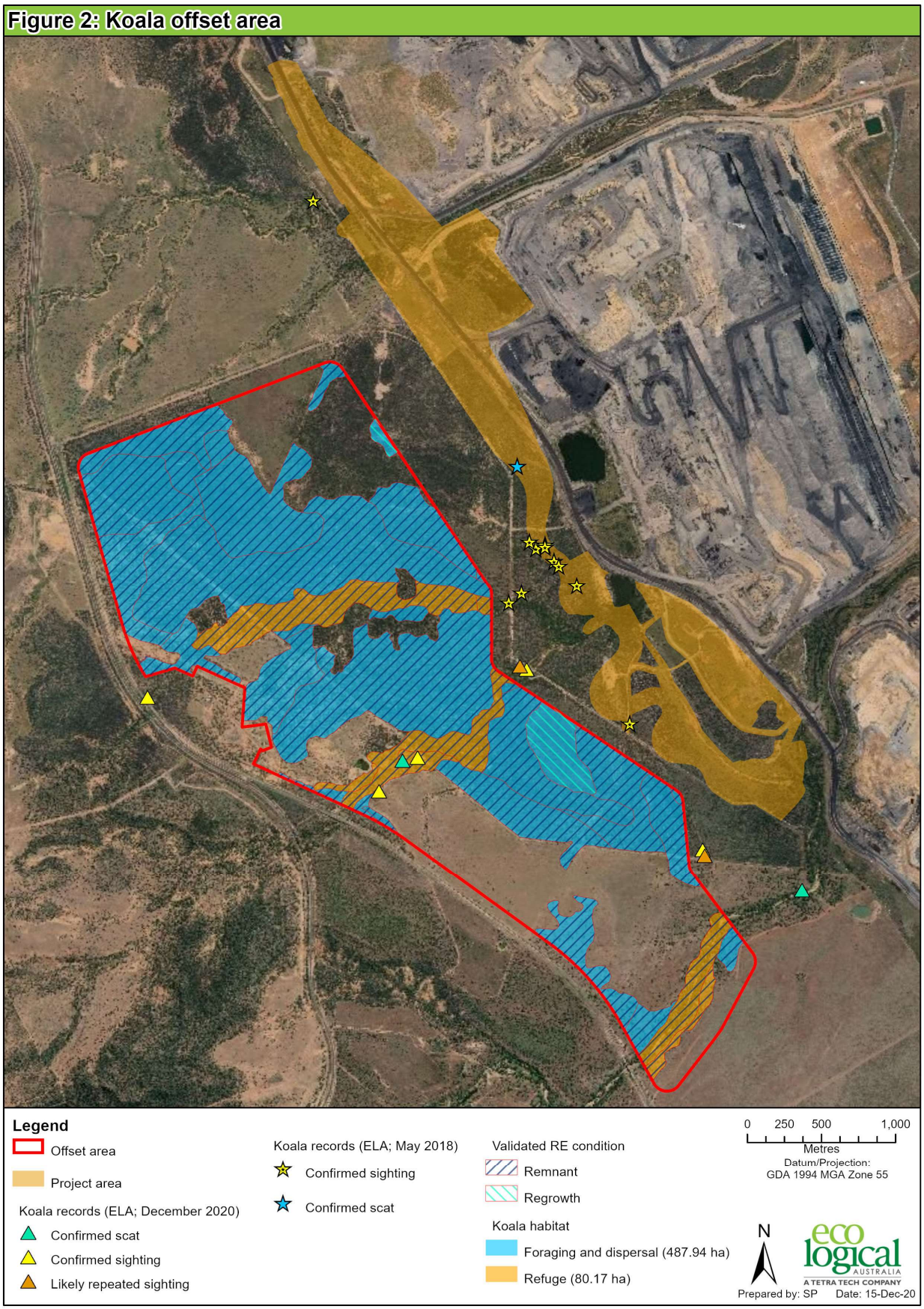
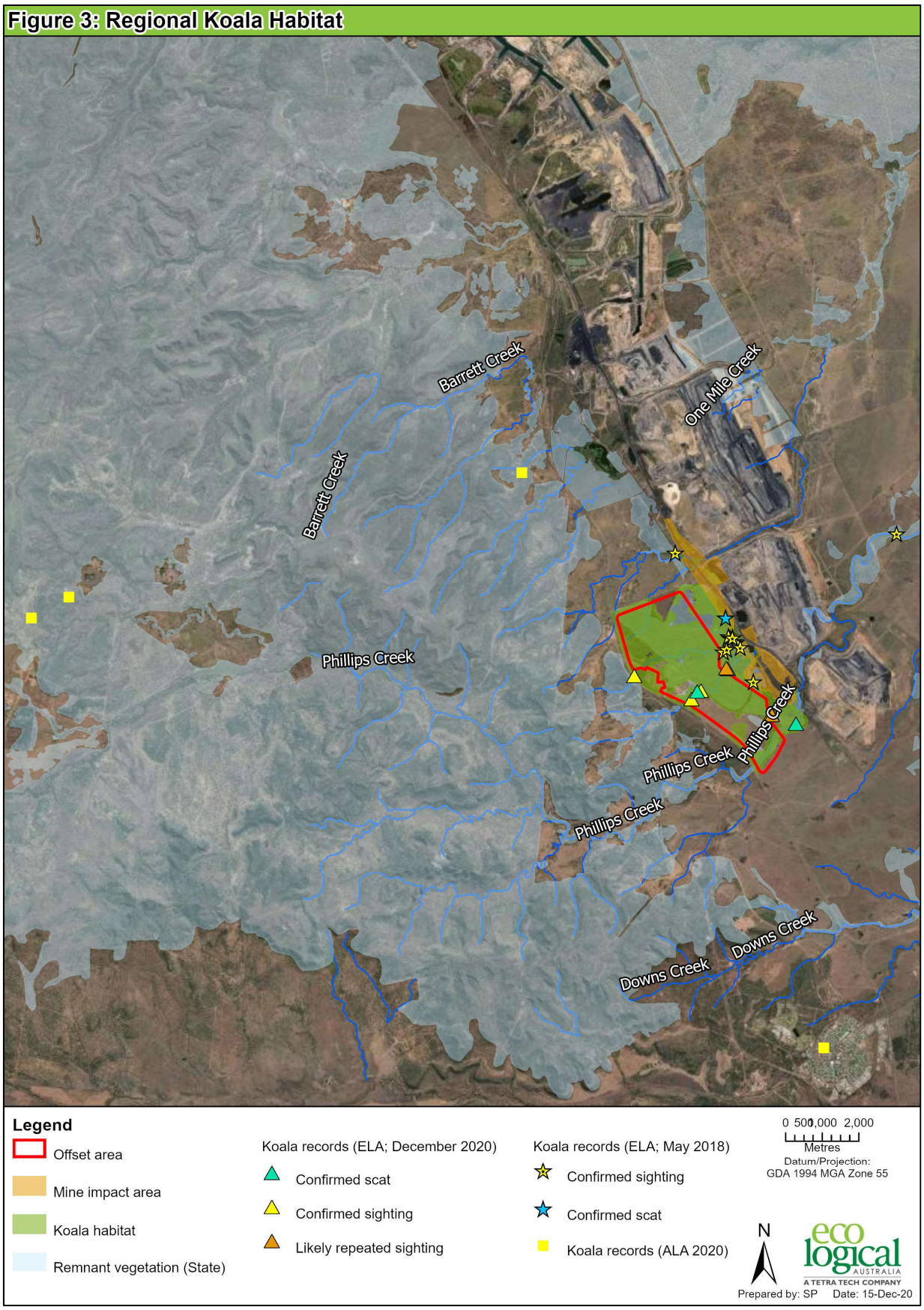


Figure 3: Landscape connectivity

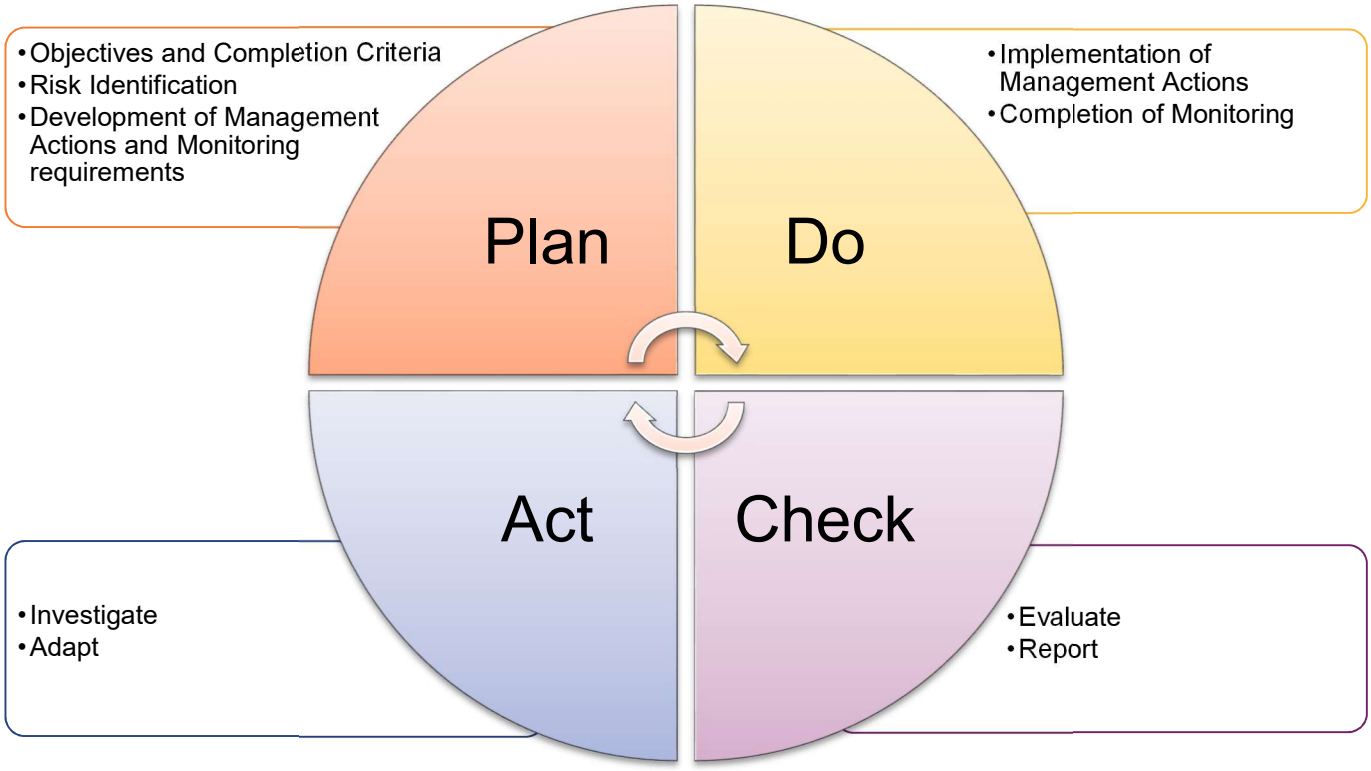


3. Offset Management Framework

3.1 Offset Management Framework

The management of the offset commitment will be implemented in accordance with an Offset Management Framework centred on an adaptive management cycle. The cycle is based on the PLAN – DO – CHECK – ACT model used in the overarching BHP EMS. The accountability for implementation of the framework will lie with BMA, however for some aspects (e.g. stock management, fence monitoring, habitat quality assessment) a suitably qualified person will be appointed and held accountable to BMA to deliver the necessary outcomes (e.g. maintenance of infrastructure, monitoring reports etc.).

A key aspect of the framework is the feedback cycle facilitated by CHECKing outcomes of monitoring, investigating contributing factors to results not considered in line with milestones or KPIs (ACT), adapting approaches to management (informed by experts where appropriate) with the aim of improving likelihood of success (ACT) and finally circling back to updating documentation and work plans (PLAN) to ensure improved actions are then incorporated and implemented (DO) in future.



The framework encompasses the following key components:

PLAN

- **Offset Management Objectives** – the understanding of the MNES values to be offset and threats to those values drives the management objectives for the site. The objectives are outlined in Section 3.2.

- **Completion Criteria** – final completion criteria specific to the management objectives have been identified. Performance targets are defined to measure performance of the management actions during the offset management period and progress toward final completion criteria. Criteria are shown in Section 3.3.
- **Risk Planning** – a risk assessment identifies threats to the management process whereby management actions and monitoring design can incorporate precautionary measures, or ensure monitoring parameters are appropriate for detection of negative results. The risk assessment is summarised in Section 3.4 and provided in detail in Appendix A.
- **Management Actions Definition** – management actions have been designed specific to the desired conservation outcomes of the offset. Actions are documented in terms of method, location, timing for implementation and responsibility. In addition, action specific performance indicators have been defined for each management action and options for corrective actions identified. Management actions and schedule are documented in Section 3.5.
- **Monitoring Program** – the monitoring requirements are documented in Section 3.6. Firstly, baseline data will be collected to establish the benchmark for reporting against. Baseline data collection will be undertaken by a suitably qualified person depending on the nature of the parameter (e.g. ecologist will be required for measuring of habitat quality whereas the location and condition of fire breaks would be assessed by a land manager).
- **Establish Process** – obligations of approval and management/monitoring commitments will be recorded in the BMA Coal Legal Obligations Register (CLOR) and Management Plan LOR. A corresponding schedule and work orders for monitoring, management actions, reporting etc. will then be incorporated into the BMA Enterprise Work Management System (SAP). Work orders will be developed to provide a detailed breakdown of tasks to be completed. The SAP provides a mechanism for tracking activity completion and assigning work orders (among other things).

Outcomes of the PLAN component of the framework are documented in the below sections of this document. The nature of the adaptive management cycle is such that the management actions and monitoring program will be updated and implemented where investigation outcomes identify a necessary amendment.

DO

- **Implementation** – management actions and the monitoring program will be implemented in accordance with the work orders as they are scheduled in SAP. Implementation will be undertaken by suitably qualified personnel depending on the nature of the task.
- **Operation** – the offset site will be operated in accordance with the management strategies defined within this OAMP. This includes land use restrictions identified to ensure the delivery of an improved environmental outcome, and the legally binding mechanism under the *Vegetation Management Act 1999* under which the offset will be secured. Offset area restrictions are shown in Section 3.5.2 and details of the legally binding mechanism described in Section 3.5.3.

CHECK

- **Evaluate** – outcomes of the monitoring undertaken will be evaluated following each monitoring event. The method of evaluation will be dependant on the parameter measured and relevant target/KPI for comparison. The monitoring schedule is shown in Table 9.
- **Report** – results of all monitoring will be captured and data collected will be maintained in an appropriate data storage format. Maintaining a record of results throughout the life of the offset will allow for trends to be identified (if relevant to measuring success) and measuring against KPIs and performance targets.

ACT

- **Record** – non-conformances (i.e. if actions were not completed within schedule) will be recorded in the BMA Event Management System, triggering an investigation. Non-conformance investigation will be completed and solutions identified and implemented.

- **Investigate -** in the event monitoring results identify performance targets or KPIs are not reached or other aspects of monitoring indicate areas of concern, an investigation will be undertaken. The investigation will:
    - Identify key drivers/parameters that relate to the monitoring result not in line with milestones or KPIs.
    - Require development of suitable mitigation or corrective actions. Where items can be solved in the short term, work order notifications will be raised within SAP for implementation (e.g. minor fencing repair). For major actions or repair works, a plan for completion will be developed in consideration of budgeting cycle or if the work is considered urgent, escalated for prioritisation. Where actions are required for impacts other than maintenance or repair activities (i.e. a change in the approach to managing the property) a koala expert will be consulted to inform the identification of appropriate corrective actions (specifically actions that are scientifically robust and targeted to the objectives of meeting completion criteria for koala conservation).

  The investigation may require multiple stakeholder input such as BHP Environment representative, the suitably qualified person appointed by landholder, ecological consultants and/or experts in specialists disciplines (e.g. koala experts) depending on the complexity of the outcome.
- **Adapt** – where investigation outcomes require a long term amendment to the OAMP (i.e. for actions or monitoring changes to be permanently implemented rather than one-time-only repair actions) relevant documents will be updated and changes to scheduling, obligations or monitoring revised in SAP (i.e. cycle back to the PLAN component) to update work orders. These updates will enable implementation of revised management and monitoring through the DO component of the framework.

Management and monitoring will continue in accordance with PLAN documentation (and subsequent updates installed as a result of the investigation process), renewing the implementation of the DO component. The framework cycle will continue until final completions criteria are determined to be reached, or for the minimum 20-year term (whichever is longer).

The OAMP will be formally reviewed every five years (at a minimum and more frequently should monitoring outputs trigger adaptive management updates). The review will consider results of all monitoring including information gathered by the suitably qualified person appointed by the landholder, results of ecological condition scoring and pest animal monitoring. The formal review will be a further opportunity for effectiveness of management actions to be assessed and amendments considered for implementation.

3.2 Offset management objectives

The management objectives of the offset area on the Tay-Glen property are to reduce threatening processes and increase the habitat quality of the area to a level at which it provides greater conservation value than its current form and that of the current impact site. The desired conservation outcomes for Koala offsets are to *protect and restore habitat in order to increase habitat extent, resources and patch connectivity so that viable populations can be sustained*.

In consideration of regional and local priority actions outlined in relevant Conservation Advice, recovery plan and threat abatement plans for the MNES value (summarised in Table 4) management actions are focussed around prohibition of disturbance activities, stock management, weed and pest management, fire management and legally securing the offset area.

Table 4: Offset management action compliance with MNES recovery plans, conservation advice and threat abatement plans

Conservation priority for MNES	Offset management actions				
	Prohibition of disturbance activities	Stock management	Weed and pest management	Fire management	Legal offset security
Koala (Approved Conservation Advice, 2012)					
Prevent habitat loss and fragmentation	✓	✓			✓
Weed and pest animal control, particularly feral dogs			✓		
Fire management to prevent mortality and habitat destruction				✓	

3.3 Completion scores and performance targets

Completion criteria developed directly relate to the management objective of increasing the habitat quality of the area for the Koala. Criteria for habitat quality and abundance of koala food trees are included.

The final completion scores for the offset area are detailed in Table 5. To increase the habitat quality score, the desired outcomes of increasing habitat extent, resources and patch connectivity as well as reducing threatening processes is the focus of management actions. Completion criteria for Koala food tree abundance have been included to ensure that the quality and availability of food resources for the species is maintained within the offset area.

To facilitate evaluation of progress toward the completion criteria, interim performance targets are provided (Table 5). These are interim target values that describe a possible path of enhancement to reach the final completion criteria. These interim target values are to help assist the management and improvement of the offset area and offset management actions. They are not criteria that must be met, rather the interim criteria used to assess progress and trigger adaptive management whereby the land manager will investigate possible causes for a lack of progress (in accordance with the Offset Management Framework).

The completion criteria for this OAMP will be met when all of the criteria (habitat quality and food tree abundance), as shown in Table 5, have achieved the required overall final completion scores listed.

Table 5: Interim and final completion criteria

Criteria / Metric	Baseline Score	Interim Performance Targets			Final Completion score (Year 20)
		Year 5	Year 10	Year 15	
Koala habitat quality score - remnant habitat area	7	7	7	8	8
Koala habitat quality score - regrowth habitat area	6	6	7	8	8
Koala food tree abundance (%) – remnant habitat*	>50%	>50%	>50%	>50%	>50%
Koala food tree abundance (%) – regrowth habitat*	<25%	<25%	26 - 50%	26 - 50%	>50%

*score calculated as the percentage of canopy vegetation that is made up of koala food trees within the habitat quality assessment plot

The baseline habitat quality scores have been calculated using the Queensland Guide to determining terrestrial habitat quality (DES, 2020). Three components contribute to the calculation of habitat quality: site condition (as per BioCondition assessment), landscape context and species habitat attributes. Offset assessments conducted under the EPBC Act also consider species stocking rate. The habitat attributes for this assessment are specifically associated with Koala habitat requirements, for example quality and availability of koala food and foraging habitat, tree canopy cover, koala mobility capacity and threats to the species; and as a result regular monitoring using this approach will provide an indication of improvement of habitat for Koala.

Each of these components consist of a number of attributes that are measured and factored into the derivation of the quality score (out of 10). The Microsoft Excel spreadsheet documenting the derivation of the baseline habitat quality score will be filed along with this OAMP for future reference (shown in Appendix B).

The interim and final habitat quality scores will be measured and calculated using the same approach (attributes, methods and analysis as documented in the Tay-Glen Offset Area Ecology Assessment Report (ELA, 2020)).

The assessment of Koala food tree abundance will be conducted concurrently with the habitat quality assessments. This assessment is a determination of the proportional cover of preferred Koala food trees within the canopy (i.e. preferred koala food tree species make up 60% of the total vegetation within the canopy layer). Suitable habitat for Koala is considered to be areas where Koala food trees comprise > 50% of total canopy cover, as per the Koala referral guidelines habitat assessment tool (DoE, 2014). As Koala food trees currently comprise > 50% of the canopy in remnant Koala habitat within the offset area, this proportion will be maintained for the life of the offset (20 years). Koala food tree abundance in regrowth areas is currently < 25% and will be increased to > 50% during the period of the offset. This increase in the abundance of koala food trees in regrowth areas will be achieved through implementation of the offset management strategies described in Section 3.5. Offset management strategies that will directly contribute to an increase in the abundance of koala food trees in regrowth areas include prevention of vegetation clearing and weed control.

3.4 Offset risks

Table 6 summarises the risks associated with achieving objectives of the OAMP. Management actions have been developed for each risk identified for incorporation into the management actions and monitoring program, and possible corrective actions have been identified if risk events are realised (see following sections). The detailed risk assessment is presented in Appendix A.

Table 6: Risks associated with management actions

Risk type	Risk	Description	Risk to koala conservation outcome
Force majeure	Drought	Dry conditions having negative ecosystem impacts by limiting ecosystem functioning as a result of a lack of water resources.	Potential to: • reduce successful recruitment of koala food tree species • limit healthy growth or sustain existing koala resource. • result in dieback leading to a reduction in canopy cover or patch connectivity
	Bushfire	Moderate to severe bushfire could cause short term degradation of the site or delay growth of established ecolosystems.	Potential to: • result in localised destruction leading to a reduction in canopy cover or patch connectivity • reduce availability of resources • create an environment suitable for opportunistic species (weeds) that may compete with koala food tree recruitment
	Cyclone or severe tropical low	Often the most significant impact from tropical cyclones or indeed tropical lows is flooding. Systems generally form between November and April.	Potential to: • result in localised destruction leading to a reduction in canopy cover or patch connectivity • reduce availability of resources • create an environment suitable for opportunistic species (weeds) that may compete with koala food tree recruitment
Standard	Overgrazing / grazing pressures	Inappropriate grazing destroys shrubs and native grass cover, and slows ecological regeneration.	Potential to: • create an environment suitable for opportunistic species (weeds) that may compete with koala food tree recruitment
	Fence failures / unauthorised access	Unauthorised access to offset area by persons, vehicles or stock.	Potential to: • lead to introduction / spread of weeds • result in damage (eg trampling) to areas suitable for recruitment of koala food tree species • result in unauthorised clearing = reduced resources, reduced patch connectivity
	Erosion	Erosion in offset area due to inadequate groundcover.	Potential to: • create an environment suitable for opportunistic species (weeds) that may compete with koala food tree recruitment • result in damage (eg trampling) to areas suitable for recruitment of koala food tree species
	Failed improvement in habitat quality	Offset site fails to achieve final completion criteria habitat quality scores, indicating the offset has not met the requirements of the offsets policy.	Conservation outcome not achieved
	Weed introduction or infestation	The extent of existing infestations of invasive weed species and exotic pasture grass expand or the weed/exotic pasture grass species	Potential to: • Limit recruitment of koala food tree species

Risk type	Risk	Description	Risk to koala conservation outcome
		become more abundant within the area.	
	Pest outbreak	Pest animal populations within the offset area increase.	Potenital to: • Lead to direct impact to resident individual koalas (eg dog attack) wherby increasing a threatened process
	High fuel loads	High fuel loads within offset area leading to increase fire risk.	See bushfire risks.

3.5 Offset management strategies

3.5.1 Offset area management actions

A range of offset management actions have been developed to ensure offset management objectives and desired conservation outcomes are achieved. Details of the offset management actions are outlined in Table 7. This includes the method, timing, location and responsibility for each management action. Specific measurable KPIs for each management action have also been developed to provide a measurable target of the offset management objectives and the overall desired conservation outcomes for the offset area.

These management actions have been designed to allow for adaptive management of the offset area (consistent with the Offset Management Framework described in Section 3.1).

Table 7: Offset area management actions and implementation schedule

Management action	Method (i.e. how the action will be implemented)	Location (i.e. where the action will be implemented)	Timing (i.e. when the action will be carried out)	Responsibility (i.e. who will be carrying out the action)
Controlled grazing of domestic livestock for the purpose of reducing grass cover and fuel loads during the dry season	Cattle will be introduced into offset area (or sub-zone of the offset area should certain areas be deemed more suitable for total exclusion of cattle to maintain habitat values) when timing and conditions are permissible. Grass cover and impacts monitored monthly when cattle grazing is occurring in the offset area to ensure progress and measurable outcomes are met. Controlled grazing will require high intensity management and cattle may need to be introduced and removed intermittently during the permissible period.	Offset area	Late dry season (from June to Dec) when grass cover exceeds 35% in regrowth vegetation and 60% in remnant vegetation and no water is present in stream order one gullies. Grass cover conditions to be monitored monthly while offset is being grazed.	Suitably qualified person appointed by landholder
Installation and maintenance of stock proof fencing to prevent unauthorised persons, vehicles or stock from accessing site	Install fencing around all external boundaries of the offset area. Where the boundary coincides with the property boundary, the fence may align with the property boundary. A fenced area may include non-offset areas and native fauna movement will be considered. Fencing will be designed and constructed to enable safe Koala movement between habitat in and outside of the offset site. Routinely inspect fencing to ensure effectiveness.	Offset area	Any required fencing of offset areas will be established within three months of the Queensland Government approving the voluntary declaration. Fencing inspected monthly during controlled grazing periods and quarterly during exclusion periods.	Suitably qualified person appointed by landholder
Prohibition of timber harvesting, cultivation and general vegetation clearing impacts	Vegetation clearing on the offset area is restricted to: a) that necessary for the removal of non-native weeds or declared pests b) ensure public safety c) construction and maintenance of access tracks, fence lines, water pipelines and firebreaks Where vegetation clearing is sought for any other purpose, the Landholder must contact the relevant department administering the VM Act (Qld) for approval. Clearing of the approved offset area (beyond premissable clearing listed above) will require additional offset areas to replace it under the EPBC Act. Native forest practice (harvesting of timber for forestry purposes) is not allowed under this Offset Area Management Plan. Cultivation is not allowed under this Offset Area Management Plan. Clearing for new fencing will be on the outside of the offset area boundary or along the property boundary. Any vegetation clearing must be undertaken in accordance with: • best practice management methods; and • any applicable legislative requirements. For example, the clearing of endangered, vulnerable or near-threatened plant species or the tampering with animal breeding places under Nature Conservation Act 1992 (Qld) Inspections of the offset area to be undertaken on a quarterly basis.	Offset area	Permissible clearing to occur as required (i.e. weed clearing, maintenance of access tracks and firebreaks). Other types of clearing prohibited for the duration term of the OAMP	Suitably qualified person appointed by landholder
Weed and pest animal baseline characterisation and ongoing monitoring	Detailed surveys will identify and map the presence, abundance and distribution of weed and pest animals to represent the baseline condition. Outcomes of baseline characterisation will be appended to the OAMP (as an appendix) for comparison following each monitoring event. Small weed infestations to be GPS marked and large infestations mapped out across the offset area. Evidence of pest animals and their activity (including key locations) will be documented and mapped. Presence and extent will be monitored (see Table 9)	Offset area	Baseline characterisation: Prior to the commencement of offset management Monitoring: for the duration of the OAMP	Suitably qualified person appointed by landholder
Weed and pest animal prevention	Implementation of good weed hygiene practices, including vehicle and machinery wash downs if equipment is coming from weed infested areas, as well as cattle quarantining	Offset area	For the duration of the OAMP	Suitably qualified person appointed by landholder

Management action	Method (i.e. how the action will be implemented)	Location (i.e. where the action will be implemented)	Timing (i.e. when the action will be carried out)	Responsibility (i.e. who will be carrying out the action)
Weed and pest animal control	Weeds: Removal of infestations of non-native weeds including invasive plants listed under the Biosecurity Act 2014 (Qld), as per the recommended controls outlined in the Department of Agriculture and Fisheries fact sheets. This includes infestations reported as part of baseline characterisation and new infestations detected during monitoring events. Buffel Grass is recognised as being a threat to the vegetation communities and habitat in the offset area; however, it is not referred to as a weed as it is not declared a restricted invasive plant under the Biosecurity Act 2014. Control measures such as grazing and increasing canopy cover of vegetation are included in this plan to decrease the extent of Buffel Grass over time. Control of Buffel Grass is best managed via grazing during the dry season and increasing tree canopy and understorey cover. Pest animals: Introduction of pest animals and control of existing populations will be minimised in accordance with the Biosecurity Act 2014 and through the development of property based feral animal management approach. Property based management will include: • Annual baiting followed by trapping targeting feral dogs • Destruction of any identified rabbit warrens	Offset area	Weed control will be undertaken as early as practicable within the natural regeneration process throughout the offset area and then periodically at the optimum time in their life cycles to control and minimise the spread of the existing weed species. Pest animal eradication (bating and trapping) will be undertaken annually during dry conditions when populations are naturally reduced or when a group of feral animals is observed.	Suitably qualified person appointed by landholder
Maintenance of fire infrastructure	Firebreaks will be maintained across the offset area. New firebreaks will be co-located with roads and fence lines where possible. Access tracks will be maintained to allow fire fighting vehicles effectively access the offset area. Inspections of the offset area to be undertaken on a quarterly basis.	Offset area	Fire control lines to be checked quarterly for condition and adequacy. Maintenance undertaken as required but on a minimum basis of every 2 years.	Suitably qualified person appointed by Landholder
Inspection & repair of key infrastructure following extreme weather event (fire, flood, cyclone)	For fire, flood or cyclone: • Determine the extent of damage to offset area infrastructure (such as fence lines) and koala habitat values caused by the event through visual inspection of infrastructure and habitat quality assessment (see habitat quality monitoring in Table 9). • Cattle will be removed from the offset area to prevent further damage to the offset area following the extreme weather event. Undertake investigation to identify a suitable time for cattle to be reintoduced – when conditions are stable and ecosystem functions have been restored. • Weed cover in areas disturbed by the weather event to be monitored to ensure progress / measure outcomes are still maintained. • Investigate to determine if additional restoration / revegetation required to maintain offset progress toward completion criteria.	Offset area	As soon as safely possible after a fire, flood or cyclone event.	Suitably qualified person appointed by the Landholder

3.5.2 Offset area restrictions

The area is managed for conservation purposes and is subject to land use restrictions to ensure the delivery of an improved environmental outcome. These restrictions are summarised in Table 8.

Table 8: Offset area restrictions

Restriction	Details
Vegetation clearing is restricted and to be undertaken only by the exemption in the Vegetation Management Act 1999 (VM Act) and EPBC Act.	1. Vegetation clearing within the offset area is restricted to: a) that necessary for the removal of non-native weeds or declared pests b) to ensure public safety c) for construction and maintenance of tracks, fence lies, water pipelnes or firebreaks d) that necessary to establish and maintain access to habitat quality assessment and photo point monitoring sites. 2. Native forest practice (harvesting timber) is not allowed under this Offset Area Management Plan. 3. Clearing for new fencing will be on the outside of the offset area boundary.
Grazing	Grazing of domestic livestock (cattle) will occur in the offset area under the following arrangements: 1. graze stock during the late dry season (June to December), at rates and times necessary to reduce the fuel load in the offset areas with a minimum grass cover to be present at the end of the dry season as follows: a) Remnant /sparse regrowth communities 60% groundcover vegetation b) Dense regrowth communities 35% groundcover vegetation. The ground cover is to be determined as per the Land Manager's Monitoring Guide published by the State of Queensland (DERM) 2010, or any subsequent published version of this document; 2. The grazing regime should allow native grasses to flower and set seed at least every two years (6-8 week period during the wet/summer season); 3. Cattle are excluded from the offset area during the wet season and during the early dry season.
Fire	Fire (apart from force majeure events) is excluded from the offset area.
Feral animals and weeds	**Feral animals** Minimise the introduction of feral animals and control of existing populations of feral animals within the offset area in accordance with the Biosecurity Act 2014 (Qld). Monitor and manage feral animal populations and subsequently adapt control effort with populations with regards to feral pigs, dogs, foxes and cats, as well as feral herbivores (e.g. rabbits). **Weeds** Keep the introduction, establishment and spread of non-native weeds including restricted invasive plants listed under the Biosecurity Act 2014 (Qld) to no more than 10% weed cover over the offset area. Control any existing infestations of non-native weeds including restricted invasive plants under the Biosecurity Act 2014 (Qld) to ensure that the non-native weeds do not cover more than 10% of the offset areas, e.g., Parkinsonia, Rubber Vine, Parthenium. Minimise the abundance and distribution of any non-native pasture species within the offset area. Note: Any weed control required will be undertaken as early as practicable within the natural regeneration process throughout the offset area and then periodically as required to treat the weeds at the optimum time in their life cycles to control and minimise the spread of the existing weed species.

3.5.3 Legally binding mechanism

The mechanism to legally secure the offset is a Voluntary Declaration (VDec) under the provisions of the *Vegetation Management Act 1999* (VM Act) where it is secured for the life of the approval, for the purposes of an environmental offset.

3.6 Monitoring

Monitoring specific to the Tay-Glen offset area will include the following components:

1. Habitat quality and food tree abundance monitoring – for assessment of progress toward completion criteria;
2. Koala population monitoring; and
3. Monitoring of implementation of management actions to inform the adaptive management approach

As described in Section 3.1 the first component of the monitoring commitment is the collection of baseline data to establish the benchmark for reporting monitoring results against. Baseline data was collected for the offset area during ecology surveys in May and December 2020. Baseline data for the offset area is available in the Spring to Phillips Creek Diversion Project Offsets Strategy (Eco Logical, 2020a).

Monitoring of the offset area will occur in accordance with Table 9 across designated locations. Monitoring and subsequent reporting is a critical component of this plan and results will require analysis against KPIs in order to trigger investigation and adaptive management where necessary.

Detailed work orders will be developed as part of the PLAN component of the Offset Management Framework. Each work order will provide detailed monitoring techniques/instruction, details of qualifications required, monitoring locations, frequency of monitoring, timing of monitoring (e.g. seasonal), parameters to be recorded and reporting requirements.

Monitoring will be undertaken in the offset area for the duration of the environmental offset or until completion criteria are met, whichever is longer. Monitoring will continue in the offset area for the duration of the environmental offset, even if completion criteria are achieved prior, to ensure the completion criteria are maintained for the 20 year period. In an instance where completion criteria are met prior to the 20 year period management actions will be re-introduced in a timely manner if monitoring detects the completion criteria are not being maintained.

All monitoring results will be recorded in documented or electronic form suitable for external audit.

Table 9: Offset management area monitoring schedule

Component	Monitoring timeframe	Attribute monitored	Frequency	Method	Location/s	KPIs	Possible corrective actions
General habitat condition	0 – 20 years	Visual reference	At the commencement of Plan (year 1), and then every 5 years for the remaining 20 years	Photopoint monitoring in accordance with Land Manager's Monitoring Guide	Each habitat quality monitoring site (see below)	No evidence of damage or degradation of habitat (eg tree dieback, pugging) when compared to baseline photographic records	Corrective actions will be determined firstly through an investigation (CHECK-ACT) to identify drivers for results, ie which attributes of habitat quality need improvement. With an understanding of which aspects of the habitat require attention, a Koala expert will be consulted to inform the development of scientifically robust management actions and possible corrective actions. Corrective actions and suitable corresponding monitoring actions will be documented and incorporated into the OAMP revisions where required (ACT-PLAN). Corrective actions will be implemented as as part of the DO component of the Offset Management Framework where the feedback loop allows for continuous improvement. Examples of corrective actions my be: • Weed removal • Livestock exclusion or change in management regime • Mechanical remediation New work orders will be developed for each new corrective action identified.
Habitat quality	0 – 20 years	Site condition: • Recruitment of woody perennial species • Native plant species richness (tree, shrub, grass, forb) • Canopy height (tree) • Canopy cover (tree, shrub) • Native grass cover • Organic litter • Large trees • Coarse woody debris • Non-native plant cover • Quality and availability of food and foraging habitat • Quality and availability of shelter	Every 5 years from the commencement of the plan, for the remaining 20 years (years 5, 10, 15 and 20). Habitat quality data collected in 2020 will constitute baseline.	Habitat quality assessment in accordance with Guide to determining terrestrial habtat quality (for fauna habitat) (DES, 2020)	19 locations of assessment units sampled for baseline of offset site (See Appendix B EcoLogical Australia 2020a)	See Section 3.3	
		Site context: • Size of patch • Connectedness • Context • Ecological corridors • Role of site to overall Qld Koala population • Threats to Koala • Koala mobility capacity					
		Species stocking rate: • presence on or adjacent to site • species usage of site • density • importance of population		As per the offsets assessment guide under the EPBC Act			
Koala food tree abundance	0 – 20 years	Koala food tree abundance	Every 5 years from the commencement of the plan, for the remaining 20 years (years 5, 10, 15 and 20). Habitat quality data collected in 2020 will constitute baseline.	Assessed as the percentage of canopy cover that comprises preferred Koala food trees.	19 locations of assessment units sampled for baseline of offset site (See Appendix B EcoLogical Australia 2020a)	See Section 3.3	

Component	Monitoring timeframe	Attribute monitored	Frequency	Method	Location/s	KPIs	Possible corrective actions
Koala population monitoring	0 - 20 years	Presence and abundance of Koalas within the offset area. Survey results will inform species stocking rates for habitat quality assessment (above).	Every five years from the commencement of the plan, for the remaining 20 years (years 5, 10, 15 and 20). Offset area Koala survey conducted in 2020 will constitute baseline data.	Field surveys to be conducted for a minimum of three consecutive nights, to include the following methods: • Direct detection: noctournal searches (spotlighting) preferrably between August and January. • Remote detection: Use of call playback, remote cameras or acoustic recording devices • Idirect detection: scat searches (Spot Assessment Technique) and scratch searches	Koala habtiat within the offset area	The number of Koalas detected within the offset area is not significanlty different the number detected during previous monitoring.	Corrective actions will be determined firstly through an investigation (CHECK-ACT) to identify drivers. If the number of koalas detected have reduced and is significantly different to previous monitoring results, an investigation into what possible changes have occurred to cause a decline, i.e. increase in feral dogs, reduction in habitat quality. With an understanding of which aspects may be causing a decline in koala population, a koala expert will be consulted to inform the development of scientifically robust management actions and possible corrective actions. Corrective actions and suitable corresponding monitoring actions will be documented and incorporated into the OAMP revisions where required (ACT-PLAN). Corrective actions will be implemented as as part of the DO component of the Offset Management Framework where the feedback loop allows for continuous improvement. Examples of corrective actions my be: • Feral animal control • Livestock exclusion or change in management regime • Mechanical remediation New work orders will be developed for each new corrective action identified.
Controlled grazing	0 – 20 years	Grass cover (%)	Monthly during controlled grazing periods	Records and photos at established monitoring points	Within offset area	At least: • 35% groundcover vegetation in dense regrowth communities; • 60% groundcover vegetation in remnant communities. Cattle removed from offset area within two weeks if grass cover falls below threshold.	Cattle to be re-instated after grass cover recovers to above threshold limits. The Offset Area Report will document the grazing periods that occurred in the offset areas during the reporting period and the correlating responsive actions that occurred as part of grazing management.
		Soil pugging	Following a large rainfall event during controlled grazing periods	Site walk over to identify pugging areas with photo records		No evidence of pugging damage in low lying wet areas or waterways. Cattle removed from offset area within 10 days of soil impacts being observed.	Cattle exclusion from impacted area. Improve surface drainage to mechanical remediation works.
		Fencing failures	Monthly during controlled grazing periods. Quaterly during exclusion periods	Site walk over to identify fencing failures with photo records		Offset area appropriately fenced. Fencing is intact and preventing unauthorised access. No breaches in fencing during cattle exclusion times.	Upon being notified or becoming aware of an unsecure offset area, the Landholder is to undertake fence maintenance and repairs to resecure the offset area as soon as possible and within a month. The Offset Area Report (section 4.2) will document the installation, maintenance and repair of fences during the reporting period.
Prohibition of disturbance (vegetation clearing)	0 – 20 years	Vegetation extent	Quarterly	Landholder observations/records and photos	Within offset area	No prohibited clearing activities undertaken in the offset area for the duration term of the OAMP. Permissible clearing to occur as required (i.e. weed clearing, maintenance of access tracks and firebreaks).	Upon being notified or becoming aware of prohibited vegetation clearing in the offset area, the Landholder is to reassess access protocols for any lessees etc. and general access within one fortnight and notifiy the relevant department administering the EPBC Act. Corrective actions

Component	Monitoring timeframe	Attribute monitored	Frequency	Method	Location/s	KPIs	Possible corrective actions
							to prevent recurrence of prohibited clearing to be implemented within one month of notification. The Offset Area Report will document any known prohibited vegetation clearing that has occurred during the reporting period and the correlating responsive actions. Permissible vegetation clearing also to be reported.
Fire (including maintenance of infrastructure)	0 – 20 years	Fuel loads	Quarterly	Landholder observations / records and photos	Within offset area	Risk of a surrounding bushfire spreading to offset area is low.	Identify key bushfire risks and develop appropriate action for example reduction of fuel loads or additional fire breaks.
		Fire infrastructure	Quarterly			Firebreaks and access tracks are well maintained. Presence of regrowth or other obstructive material is removed from firebreaks and access tracks within one month.	Presence of regrowth or other obstructive material is removed from firebreaks and access tracks within one month. The Offset Area Report will document any maintenance activities that have occurred during the reporting period.
		Incidence and extent	As required			No unplanned fire impacts the offset area.	In the event of a fire undertake an investigation regarding the incident to identify the extent of impact to the offset area and MNES values. Outcomes of the investigation will provide corrective actions options. Actions may include: • Infrastructure repairs • Review of fuel load thresholds
Weed occurrence	0 – 20 years	Presence, abundance and distribution	Bi-Annually	Surveys to compare the presence, abundance and distribution of weeds against baseline mapping (See Table 7) .	Within offset area	Presence, abundance and distriution of weeds does not exceed baseline measures. Introduction, establishment and spread of weeds listed as restricted invasive plants under the Biosecurity Act 2014 (Qld) to less than 10% weed cover in the ground, shrub and tree layers in the offset area. Annual monitoring report to be compiled (and retained) to record methods and timing of monitoring, outcomes of the weed identification activities, analysis of comparison against baseline mapping, and summary of weed treatment implemented since the previous monitoring event.	Upon being notified or becoming aware of a weed outbreak, the Landholder is to reassess weed hygiene protocols to identify aspects for improvement. Upon being notified or becoming aware of declared plants being present in greater than 10% of the baseline extent the Landholder is to implement weed control measures within one month. Corrective actions may include: • Weed removal • More frequent monitoring to identify rate of spread • Reassess weed hygiene protocols
		Weed hygiene declaration certificates	As required	Landholder observations / records		All vehicles not owned by BMA or suitably qualified person appointed by landholder (who is managing the land) to provide a weed hygiene declaration prior to site entry.	Re-education of relevant team members to encourage appropriate implementation of mangement requirement.
Pest species occurrence	0 – 20 years	Occurrence or other physical evidence observed by landholder	Quarterly collation of records	Landholder observations / records and photos	Within offset area	Presence, abundance and distribution of pest animals does not exceed baseline measures. No evidence of predation on relevant EPBC listed threatened species by feral animals.	Where presence, abundance and distribution exceed baseline measures an investigation into the severity of the exceedance will be undertaken. Upon being notified or becoming aware of pest animals being introduced or an ongoing trend of increased abundance, the Landholder is to implement pest control measures within one month.
		Presence, relative abundance and distribution	Bi-annually	Remote cameras deployed for a minimum of one week	Within representative locations of the offset area	Presence, abundance and distribution of pest animals does not exceed baseline measures for greater than three consecutive monitoring events (noting seasonal variation in abundance is expected for some species).	Upon becoming aware of pest animals being introduced or an ongoing trend of increased abundance, the Landholder is to implement pest control measures (eg. baiting and/or trapping) within one month.

Component	Monitoring timeframe	Attribute monitored	Frequency	Method	Location/s	KPIs	Possible corrective actions
Maintenance of infrastructure following extreme weather	0 – 20 years	Infrastructure conditions	As required	Landholder observations/records and photos	Within offset area	All infrastructure is re-instated as soon as practicable. Protected matter are not significantly impacted by unplanned event.	Upon being notified or becoming aware of flood and cyclone event occurring in offset area, the Landholder is to undertake fence maintenance and repairs to resecure the offset area within one month. Refer to weed and pest animal control corrective actions. Refer to cattle exclusion corrective actions. Revegetation/restoration works implemented to address impacts on protected matters from unplanned fire or weather event. In this instance a rehabilitation or revegetation specialist will be consulted to develop a works program specific to: • The nature of the habitat destruction (eg total loss or partial damage to the ecosystem) • The extent of the habitat destruction (eg widespread or localised to riparian corridors) • The seasonal conditions at the time of the planned works The duration of the works program will be dependant on the scale of the habitat destruction and will likely combine weed management aspects. The works program will follow a component of 'investigation' within the Offset Management Framework whereby the resulting program will be incorporated into the OAMP and implementation as part of the 'DO' component. Revegetation/restoration works will be completed on an as needs basis when monitoring results (as part of regular monitoring or following assessment after an extreme event) determine habitat quality is not in line with the required milestones or KPIs.

3.7 Force Majeure

The offset risk assessment identified a number of potential risks to achieving the objectives of the OAMP that may result in significant set-backs to the progress toward final completion criteria. For example, in the event of a catastrophic bushfire, severe cyclone or prolonged drought, whereby the habitat values of the site are severely impacted. The purpose of the offset is to counterbalance the significant residual impacts of the Spring to Phillips Creek Diversion Project and in the event a catastrophic event occurs BMA are committed to fulfilling the requirements of the approval.

BMA will notify DAWE as soon as it becomes aware the offset area has been affected by a Force Majeure event and will take all reasonable steps to prevent, limit and minimise the effects of the event on the habitat quality of the offset area. Depending on the severity of the event the OAMP may require a formal review and consultation with stakeholders/advisors (including experienced land managers or Koala experts) to identify appropriate course of action (in accordance with the Offset Assessment Framework approach). Identification of alternative management strategies (and corresponding monitoring) will prompt an update to the OAMP, the monitoring program and the schedule of work orders (in accordance with the PLAN – DO – CHECK – ACT approach). Updates would then be implemented in accordance.

BMA currently manages a portfolio of seven offset sites across the region. Sites secured for the sole purpose of providing compensatory measures in accordance with Queensland of Commonwealth offset requirements. In the event of a catastrophic event at Tay-Glen BMA will be able to draw on experience in managing the other offset sites. Similarly, BMA undertakes a variety of rehabilitation activities within it's operations and as a result has access to commercially available stores of seed for us in regeneration activities. As described in Table 9 revegetation/restoration works will be implemented to address impacts on protected matters from catastrophic events. A rehabilitation or revegetation specialist, as well as Koala specialist, will be consulted to develop a works program specific to the extent and nature of the impact.

4. Reporting

BMA will prepare a report on the implementation of this management plan at year 5, and then every five years for the remaining 15 years or until completion criteria are met (for a minimum of 20 years whichever is longer). The report will summarise the activities implemented under the plan, and discuss the effectiveness of mitigation measures, based on the results of monitoring activities. Reporting will be conducted through internal BMA compliance reporting and will be made available upon request.

References

Eco Logical Australia (2020a) Spring to Phillips Creek Diversion Project Offsets Strategy. Report prepared for BHP.

Eco Logical Australia (2020b) Spring to Phillips Creek Diversion – Assessment of Matters of National Environmental Significance. Prepared for SLR Consulting.

Department of Environment (2014) EPBC Act referral guidelines for the vulnerable koala.

Department of Environment and Resource Management (2010) Land Manager's Monitoring Guide.

Department of Environment and Science (2020) Guide to determining terrestrial habitat quality. Methods for assessing habitat quality under the Queensland Environmental Offsets Policy. Version 1.3 February 2020.

Department of Sustainability, Environment, Water, Population and Communities (2012) Approved Conservation Advice for *Phascolarctos cinereus* (combined populations in Queensland, New South Wales and the Australian Capital Territory).

Appendix A Risk Analysis

Risk type	Risk event	Risk description	Initial risk ranking			Management Actions	Residual risk ranking			Performance criteria	Management triggers	Corrective actions	Monitoring
			Likelihood	Conseq-uence	Result		Likelihood	Conseq-uence	Result				
Force majeure	Drought	The risk posed by drought is a decrease in groundcover, an increase in the likelihood of unplanned fire due to the dry conditions that could be started by lightning strike during storms and an increase in weed cover when rainfall does occur. There would also be lower levels of growth expected. Depending on duration, severe drought may prevent achievement of completion criteria within the 20 year period.	Likely	Minor	Low	Limited mitigation measures can be implemented. Grazing of the offset area will be in accordance with this plan to ensure that minimum grass cover requirements are met.	Likely	Minor	Low	Offset acheives interim and final completion criteria	The district or property is Drought Declared by the Qld Government. Decline in habitat quality on the offset.	Allow offset area to recover post drought. Grazing to be suspended if groundcover falls below specified levels (35% cover in dense regrowth and 60% cover in remnant communities).	Inspections by the suitably qualified person appointed by the landholder as per Table 7.
	Bushfire	Moderate to severe bushfire could cause short term degradation of the site or delay ecological regeneration to the point that the site is unable to achieve improements in ecological condition within the period of the offset.	Possible	Major	High	In the event of a fire approaching the offset site, or actually occurring on site, the landholder will coordinate with relevant fire and emergency services. To reduce the likelihood of fire occurring, fuel loads will be managed and kept as low as practicable at all times, and firebreaks will be established and maintained. Fire will not be used as a tool for management. To prevent arson, only authorised persons will be permitted on site, and site access will be restricted through fencing and other barriers as appropriate. Surveys undertaken as soon as possible following unplanned fire to measure impacts to habitat quality.	Possible	High	Medium	Groundcover will be managed and kept as low as practicable at all times. Firebreaks established and maintained. No unplanned fire occurs. MNES are not adversely impacted by unplanned fire.	Groundcover exceeds 60%. Fire impacts the offset site. Unauthorised access to the site is detected or notified to the Landholder. MNES are not adversely impacted by unplanned fire.	If fire impacts the offset site, the offset area will be destocked, fire breaks and control lines will be re-established. If unauthorised access to the site is detected (or notified to the Landholder will, within two weeks, identify the means of access and repairfencing or other barriers as needed to prevent future access via that route. Restoration/revegetation measures to support recovery of habitat quality.	Inspections by the suitably qualified person appointed by the landholder as per Table 7. The suitably qualified person appointed by the landholder will also keep themselves advised of any fires in the region.
	Cyclone or severe tropical low	Often the most significant impact from tropical cyclones or indeed tropical lows is flooding. Systems generally form between November and April.	Possible	Minor	Low	Determine the extent of damage to offset area infrastructure (such as fence lines) and habtiat quality caused by the event. Cattle to be removed from the offset area to prevent further damage to the offset area following the extreme weather event.	Possible	Minor	Low	Offset achieves interim and final completion criteria. MNES are not advesely impacted by extreme weather event.	Extreme weather event occurs. MNES are not advesely impacted by extreme weather event.	All infrastructure is re-instated as soon as practicable. No evidence of pugging damage in low lying wet areas or waterways. Cover of weeds listed as restricted invasive plants under the Biosecurity Act 2014 (Qld) reduced to less than 10% weed cover in the	Inspections by the suitably qualified person appointed by the landholder as per Table 7.

Risk type	Risk event	Risk description	Initial risk ranking			Management Actions	Residual risk ranking			Performance criteria	Management triggers	Corrective actions	Monitoring
			Likelihood	Conseq-uence	Result		Likelihood	Conseq-uence	Result				
						Weed cover in areas disturbed by the weather event to be monitored to unsure progress / measure outcomes are still maintained.						ground, shrub and tree layers in the offset area.	
Standard	Overgrazing	Inappropriate grazing destroys shrubs and native grass cover, and slows ecological regeneration.	Possible	High	Medium	Cattle introduced into offset area when timing and conditions are permissible. Grass cover and impacts monitored monthly to ensure progress and measurable outcomes are met. Controlled grazing will require high intensity management and cattle may need to be introduced and removed intermittently during the permissible period.	Unlikely	Minor	Low	Stock grazed only at permissable times and grass cover remains above threshold limits. No evidence of soil impacts (e.g. pugging) in low lying wet areas or waterwyas. Habitat quality is maintained.	Cattle in offset area outside of permissable times or grass cover thresholds not met, soil impacts evident. Habitat quality is deteriroating.	Cattle removed from offset area within two weeks if grass cover falls below threshold. Cattle to be re-instated when grass cover recovers to above threshold limits. Cattle removed from offset area within 10 days of soil impacts being observed. Localised removal of cattle where deterioration in habtiat quality is detected.	Inspections by the suitably qualified person appointed by the landholder as per Table 7.
	Fence failure	Unauthorised access to offset area by persons, vehicles or stock.	Possible	Minor	Low	Appropriate fencing installed. Fencing inspected monthly during controlled grazing periods and quarterly during exclusion periods.	Unlikely	Minor	Low	No unauthorised access to offset area.	All offset areas appropriately fenced. Fencing is intact and preventing unauthorised access. No breaches in fencing during cattle exclusion times.	Upon being notified or becoming aware of an unsecured offset area, the Landholder is to undertake fence maintenance and repairs to resecure the offset area as soon as possible and within a month.	Inspections by the suitably qualified person appointed by the landholder as per Table 7.
	Erosion	Erosion in offset area due to inadequate groundcover.	Possible	Minor	Low	Grazing and vegetation clearing is undertaken in accordance with this plan.	Unlikely	Minor	Low	No significant erosion activity is present within ofset area.	Significant erosion activity present within offset area, groundcover thresholds not met.	Cattle removed from offset area within two weeks if grass cover falls below threshold. Cattle to be re-instated when grass cover recovers to above threshold limits. Suitability of grazing regime to be reviewed if erosion is ongoing.	Inspections by the suitably qualified person appointed by the landholder as per Table 7.
	Failed regeneration	If the offset site fails to achieve final completion criteria, that will indicate that the offset has not met the requirements of the offsets policy, nor achieved the outcomes that were key to the rationale for the approval decision.	Rare	Critical	High	The VDec will ensure that the landholder remains obliged to undertake active management of the offset until all completion criteria are achieved. Therefore, the risk is that failure to achieve the criteria leads to a requirement for further management of the offset, or to provide additional offsets.	Rare	Major	Medium	Offset achieves interim and final completion criteria.	Interim completion criteria not met at designated intervals. Completion criteria not met at year 20.	Investigation to be completed in order to develop a suitable management approach for achieving completion criteria. Outcomes of the investigation to be incorporated into the OAMP for implementation. This may include revegetation/restoration works. Additional offsets sourced to make up shortfall in habitat if required.	Monitoring as per Table 9.
	Weed introduction	The extent of existing infestations of invasive weed species and exotic pasture grass expand	Likely	High	High	Access to the offset area will be restricted. Weed control undertaken in accordance with this plan.	Unlikely	Minor	Low	Introduction, establishment and spread of weeds listed as restricted invasive plants	Weed cover > 10% within offset area. Deterioration in habtiat quality score,	Upon being notified or becoming aware of declared plants being present in greater than 10% of the baseline extent the Landholder is to	Monitoring as per Table 9.

Risk type	Risk event	Risk description	Initial risk ranking			Management Actions	Residual risk ranking			Performance criteria	Management triggers	Corrective actions	Monitoring
			Likelihood	Conseq-uence	Result		Likelihood	Conseq-uence	Result				
		or the weed/exotic pasture grass species become more abundant within the area.								under the Biosecurity Act 2014 (Qld) to less than 10% weed cover in the ground, shrub and tree layers in the offset area. Habitat quality continues to meet the required completion criteria at required intervals.	including not meeting interim completion criteria.	implement weed control measures within one month.	
	Pest outbreak	Pest animal populations within the offset area increase.	Possible	Moderate	Medium	Pest animals wil be controlled in accordance with this plan. Survey for adversely impacted MNES (idividuals and habitat), i.e. evidence of dog attack	Possible	Minor	Low	No increase feral animal numbers within the offset area. Maintain pest animal control program. No evidence of new pest species. MNES are not adversely impacted by pest animals.	Increased pest animals within offset area.	Upon being notified or becoming aware of pest animals being present, the Landholder is to implement pest control measures within one month.	Monitoring as per Table 9.
	High fuel loads	High fuel loads within offset area leading to increase fire risk	Possible	Moderate	Medium	Management of fuel loads via controlled grazing within the offset area will be undertaken in accordance with this plan.	Possible	Minor	Low	Groundcover will be managed and kept within threshold limits at all times.	High fuel loads in offset area (groundcover not meeting threshold limits).	Fuel load within offset reduced via the use of grazing.	Inspections by the suitably qualified person appointed by the landholder as per Table 7.

Qualitative measure of likelihood (how likely is it that this event/circumstance 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

Appendix B Offsets Assessment Guide Content

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		**Area**	74	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	44.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	44.40	Adjusted hectares		**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	549.6	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	90%	0.00	0.00	42.25	95.15%	Yes		
									Future area without offset (adjusted hectares)	549.6	**Future area with offset (adjusted hectares)**	549.6								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**7**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**8**	1.00	80%	0.80	0.77				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	44.4	42.25	95.15%	**Yes**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		**Area**	74	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	44.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	44.40	Adjusted hectares		**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	18.5	**Risk of loss (%) without offset**	15%	**Risk of loss (%) with offset**	0%	2.78	90%	2.50	2.40	5.55	12.49%	No	
									Future area without offset (adjusted hectares)	15.7	**Future area with offset (adjusted hectares)**	18.5								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**8**	3.00	80%	2.40	2.31				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	44.4	5.55	12.49%	**No**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**