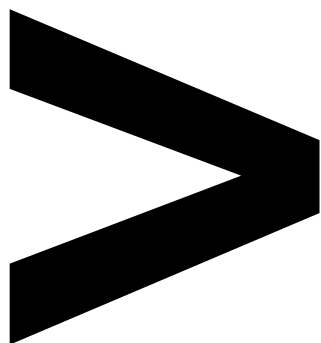




HUNTER VALLEY OPERATIONS

Biodiversity Offset Strategy (EPBC 2016/7640)

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Biodiversity Offset Strategy V6 2024

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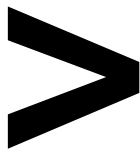
18/12/2024

REVIEW

18/12/2027

OWNER

Hunter Valley Operations



Declaration of accuracy

I declare that:

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

Signed

MICHAEL LLOYD

(Environment and Community Co-ordinator)

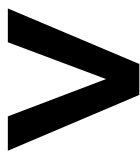
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HUNTER VALLEY OPERATIONS

Organisation (please print)

03/06/2025

Date



Executive Summary

This biodiversity offset strategy (BOS) has been prepared in accordance with Conditions 4, and 9 of the final approval decision notice for the Hunter Valley Operations (HVO) State-approved mining project (EPBC 2016/7640) (the action). HVO is a joint venture operation located 24km north of Singleton.

The action was approved by the Acting Assistant Secretary on 10 October 2016, subject to conditions and the action commenced on 1 November 2016. A variation to Condition 5, 6, 7 and 9 of EPBC 2016/7640 was sought by the proponent on 15 July 2017 under Section 143(1)(c) of the EPBC Act. Approval of the variation was granted on 11 August 2017. The revised conditions relate to the provision of offsets for the residual impacts of EPBC 2016/7640 on CHVEFW, Regent Honeyeater and Green and Golden Bell Frog.

The conditions required the rehabilitation of 230 hectares (ha) of grazing land at the Wandewoi Biodiversity Area. Following concerns from HVO on the compliance risk of rehabilitating this area under drought conditions, coupled with comments from the local community against the reduction of quality grazing lands, HVO discussed with the Department, the possibility of an offset swap to reduce the extent of rehabilitation and reducing the loss of grazing lands. On 25 September 2020, an application was submitted that sought approval to:

- a) vary the approval to allow for the grassland component of the Wandewoi offset to be swapped for the Hook property that contains the critically endangered Central Hunter Valley eucalypt forest and woodland;
- b) vary the approval to extend the date by which the offsets must be secured;
- c) vary the approval to permit the use of a s305 conservation agreement under Part 14 the EPBC Act to secure the sites in perpetuity; and
- d) request approval for the HVO offsets to be secured by entering into a s305 conservation agreement under Part 14 of the EPBC Act.

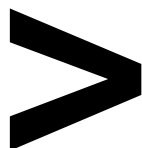
The conditions of approval were contemporised to account for works undertaken by HVO in establishing the biodiversity areas, and reflect the compensation offer that addressed the action's impact. Specifically, Condition 4 outlines the requirements to enter a conservation agreement to adequately offset impacts on CHVEFW CEEC and the Swift Parrot. The residual impacts, including that on the Regent Honeyeater and the Green and Golden Bell Frog, are addressed in Condition 9.

This BOS has been prepared in accordance with the above conditions and the Offset Strategy Checklist provided by the Department of Environment and Energy (DoEE).

The BOS has five objectives:

1. To compensate for residual significant impacts to 54.4 ha of Class A condition CHVEFW from the Riverview Pit extension area;
2. To compensate for residual significant impacts to 6.6 ha of Class B condition CHVEFW from the West Pit extension area
3. To compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater;
4. To compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog; and
5. To compensate for residual significant impacts to 68.1 ha of winter foraging habitat for the Swift Parrot.

A staged process was originally implemented to identify offset sites that achieve the objectives of the BOS. The first stage comprised a detailed desktop analysis of previous local studies and GIS datasets to identify multiple potential offset sites that contain CHVEFW, Swift Parrot, Regent Honeyeater and/or Green and Golden Bell Frog habitat. A large number of potential offset sites were



identified as part of the desktop analysis. The list of these sites was refined to landowners willing to enter into a contract and/or provide access for site assessment purposes.

Preliminary surveys were conducted to determine if the properties identified contained the required biodiversity values. HVO then selected suitable offset sites, namely Mitchelhill BA (comprising Mitchelhill East and Mitchelhill West), Condon View BA and Crescent Head BA (comprising Crescent Head (north) and Crescent Head (south)). Following proposed revisions to the Wandewoi BA boundaries, the Hook BA was surveyed and assessed using the NSW BioBanking Methodology (BBAM) for inclusion in the BOS. These offset sites were selected based on the results of the preliminary surveys, an assessment of land values and the practicality of ongoing management that would be required. Detailed surveys were completed at these sites to determine the extent of CHVEFW, Swift Parrot and Regent Honeyeater habitat, and targeted surveys and habitat assessment for the Green and Golden Bell Frog.

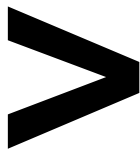
Following the completion of surveys, the Offset Assessment Guide (DSEWPaC 2012b) was completed for each of properties to determine the percentage of direct offset provided for CHVEFW, Swift Parrot, Regent Honeyeater and Green and Golden Bell Frog. The sites provide a 100% (or higher) direct offset for CHVEFW and Regent Honeyeater, and a 99.29% direct offset for the Green and Golden Bell Frog. The residual 0.71% offset for the Green and Golden Bell Frog has been provided through a contribution to a research programme.

The primary measures to achieve the strategy's objectives comprise:

- the provision of Mitchelhill BA, Condon View BA, Crescent Head BA, Wandewoi BA and Hook BA as direct offsets for CHVEFW CEEC, Regent Honeyeater, Swift Parrot and Green and Golden Bell Frog;
- contribution to a research or conservation program to satisfy the 0.71% residual offset requirement for the Green and Golden Bell Frog;
- implementation of management measures at the direct offset sites, comprising:
 - strategic grazing and weed management to improve the quality of CHVEFW, Swift Parrot and Regent Honeyeater habitat;
 - revegetation of corridors through derived native grasslands to increase the area and resilience of CHVEFW, Swift Parrot and Regent Honeyeater habitat;
 - investigation of the need for Noisy Miner management in Swift Parrot and Regent Honeyeater habitat;
 - management of Mosquito Fish to create suitable conditions for Green and Golden Bell Frog breeding;
 - maintenance of vegetation structure in existing open areas as Green and Golden Bell Frog foraging habitat.

Long-term management of the offset sites will be directed by an Offset Management Plan that outlines the management activities occurring within each offset. The individual draft plans for each offset have been combined into the one document due to the extensive duplication of the management actions occurring across the various offsets. The plan will describe the offsets and detail the actions that will be implemented to improve and protect CHVEFW and the habitat for Regent Honeyeater, Swift Parrot and Green and Golden Bell Frog. The properties will be secured under an appropriate legally binding mechanism.

It should be noted that other matters/species not offset by this strategy may also be offset using the properties identified. For example other species credits may be calculated and retired using the offset properties for other projects.



Risk assessment has enabled risks to achievement of strategy objectives to be identified. The key residual risks to achieving the strategy’s objectives comprise:

- delays in negotiation with the Department regarding a suitable offset mechanism; and
- implementation of the Offset Management Plan for the proposed offset properties.

Contingency measures in the form of corrective actions have been developed to manage these risks, if required. Where corrective actions have not been identified, commitments have been made to detail these in the Offset Management Plan for the proposed offset properties.

Glossary

Term	Definition
BA	Biodiversity Area
BBAM	BioBanking Assessment Methodology
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
CHVEFW	Central Hunter Valley Eucalypt Forest and Woodland
Department	The Australian Government Department or any other agency that is responsible for administering the EPBC Act.
Direct offset site	An offset site that is required by Conditions 4, 5, 6, and 7 that will protect and improve habitat for the relevant protected matter.
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DoEE	Department of Environment and Energy
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPBC Act Offset Policy	The Australian Government Department of Sustainability, Environment, Water Population and Communities (2012) <i>Environment Protection and Biodiversity Conservation Act 1999</i> Environmental Offsets Policy. Commonwealth of Australia, Canberra.
HVO	Hunter Valley Operations
Legally binding agreement	A legal mechanism that has been agreed by the Minister to secure and protect an offset site in perpetuity.
Minister	The Commonwealth minister responsible for administering the EPBC Act.
MNES	Matters of National Environmental Significance
Person taking the action	The person to whom the approval is granted as identified on the approval notice for EPBC 2016/7640.
Protected matter	Any matter protected under the provisions of the EPBC Act for which the approval applies. These are CHVEFW, regent honeyeater, swift parrot and green and golden bell frog.

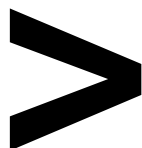


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1 Introduction

1.1 Background

The action is referred to as Hunter Valley Operations (HVO) – State-approved mining project (EPBC 2016/7640). It comprises the continuation of mining in areas approved by the New South Wales (NSW) State Government after the commencement of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 16 July 2000 and prior to commencement of the *EPBC Amendment Bill 2013* (also known as the water trigger) on 22 June 2013. HVO is a joint venture operation located 24km north of Singleton. The action is shown on Figure 1.1.

The action was submitted for determination under the EPBC Act to the former Department of the Environment (DoE) (now the Department of Climate Change, Energy, the Environment and Water (DCCEEW)) on 29 January 2016. On 3 March 2016, the Minister determined that the action was a controlled action under Section 75 of the EPBC Act and was required to be assessed by preliminary documentation under Section 87 of the EPBC Act.

The preliminary documentation was submitted to the Department on 5 May 2016. The preliminary documentation report concluded that the action was likely to result in significant impacts on the following protected matters:

- Central Hunter Valley eucalypt forest and woodland ecological community (CHVEFW);
- Regent Honeyeater (*Anthochaera phrygia*);
- Swift Parrot (*Lathamus discolor*); and
- Green and Golden Bell Frog (*Litoria aurea*).

The preliminary documentation report included a preliminary strategy to provide offsets for the above protected matters, in accordance with the EPBC Act Environmental Offsets Policy (DSEWPac 2012).

The action was approved by the Acting Assistant Secretary on 10 October 2016, subject to conditions. The action commenced on 1 November 2016.

Due to the ongoing drought conditions that was experienced in NSW, the requirement to regenerate up to 230 ha of grassland at the Wandewoi BA presented a compliance risk and there are community concerns in relation to the loss of the agricultural landscape of Jerrys Plains. On the 18 October 2018, HVO proposed to vary the conditions of approval to substitute the majority of the grassland areas of the Wandewoi BA with equivalent habitats within the Hook BA in Belford, NSW.

It was determined by the Department that, in order to facilitate an adequate offset swap for the CHVEFW, it must be demonstrated that the revised offset package meets the approved quantum of impact as calculated by the EPBC Offset Assessment Guide tool. It was also agreed that the calculations that have been accepted by the Department would not be altered, and only those calculations that are impacted by the proposed variation would be contemporised.

An assessment of the Hook BA using the Commonwealth-accredited BioBanking Assessment Methodology (BBAM) and the EPBC Offset Assessment Guide tool was undertaken to demonstrate that the offset swap provides the same or greater offset quantum outcome to the offset required.



The final approval decision notice requires that land at the Wandewoi, Hook, Condon View and Mitchelhill BAs is secured and that it must:

- a) Include no less than:
 - i. 405.8 hectares of the CHVEF ecological community;
 - ii. 175.8 hectares of foraging habitat for the Swift Parrot; and
 - iii. 40 ha of regenerating foraging habitat for the Swift Parrot.
- b) Compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater.
- c) Compensate for residual significant impacts to 2.6ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog.

In accordance with the approval, the Wandewoi and Hook BAs offset the majority of the action's impacts on CHVEFW and 100% of the action's offset requirements for the Swift Parrot. The Mitchelhill BA offsets 100% of the residual impacts on CHVEFW and 53.9% of the residual Regent Honeyeater impacts. Condon View BA will offset the remaining 46.6% of the residual Regent Honeyeater impacts. Crescent Head BA will offset 100% of the residual significant impact on the Green and Golden Bell Frog when combined with the other compensatory measures.

This Strategy addresses the requirements.

1.2 Purpose

The purpose of this Biodiversity Offset Strategy (BOS) is to demonstrate:

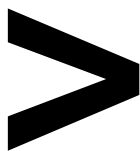
- compliance with Variation of Conditions Attached to Approval EPBC ref 2016/7640;
- the development of the offset package;
- how direct offsets will be identified, secured, and managed into perpetuity;
- how indirect offsets have been identified, where required; and
- how the action's residual offset requirements are fulfilled for CHVEFW, Swift Parrot, Regent Honeyeater, and Green and Golden Bell Frog.

1.3 Framework

This BOS has been prepared in accordance with the conditions of the Variation of Conditions Attached to Approval EPBC ref 2016/7640, and addresses all recommendations in the offset strategy checklist (Table 1.2) derived from the DCCEE (2024) Environmental Management Plan Guidelines. Compliance with the conditions and the offset strategy checklist is demonstrated in Table 1.1 and 1.2, respectively.

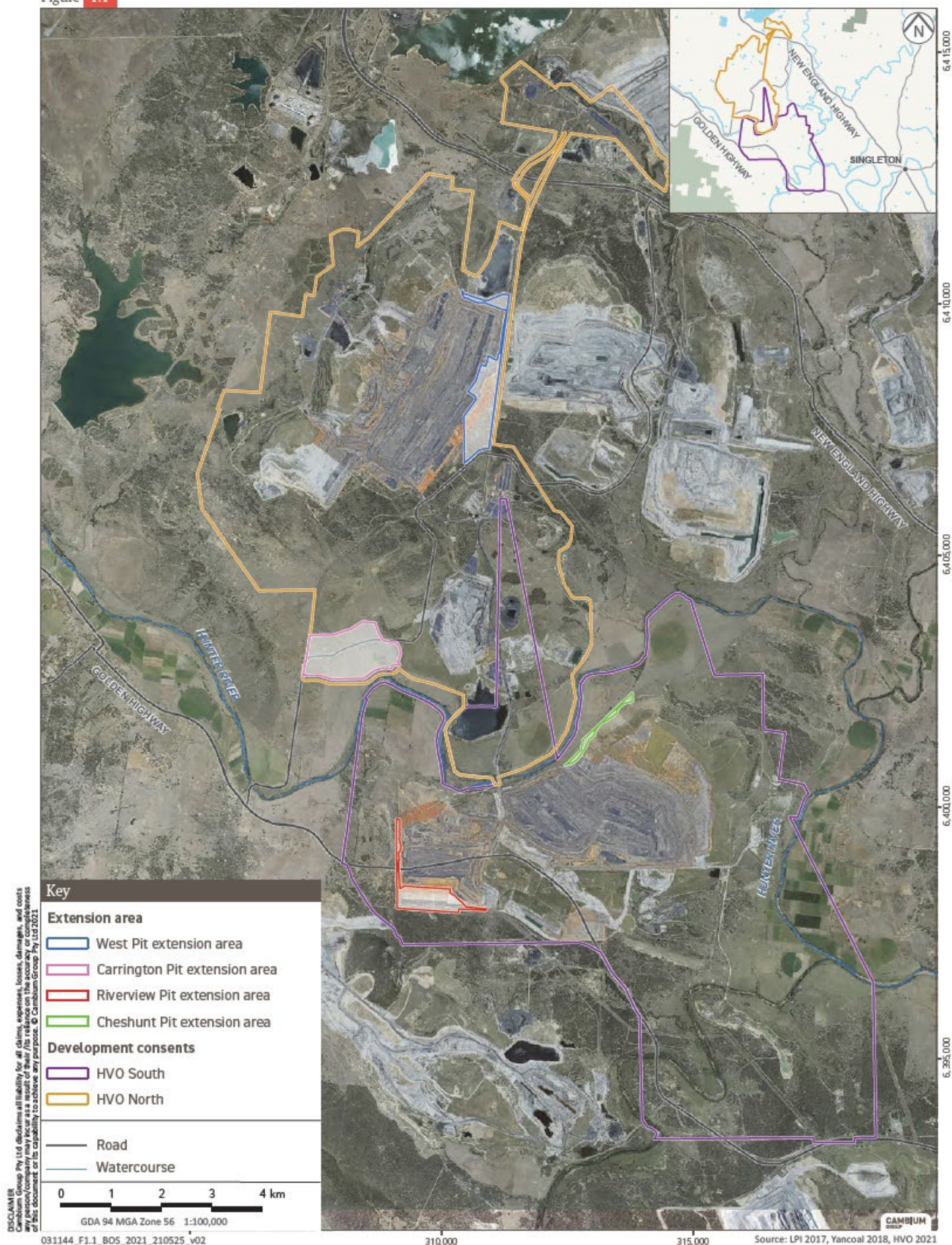
Table 1.1 - BOS compliance with Conditions

Condition	Page/Section Addressed in this Strategy
4. ...the Conservation Agreement for each offset area [is to] meet the requirements of the EPBC Act Offsets Policy and must: a) Include no less than: i. 405.8 hectares of the CHVEF ecological community; ii. 175.8 hectares of foraging habitat for the Swift Parrot; and iii. 40 hectares of regenerating foraging habitat for the Swift Parrot. b) Compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater. c) Compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog.	



HVO State-approved mining project
Biodiversity Offset Strategy 2024: EPBC 2016-7640

Figure 1.1



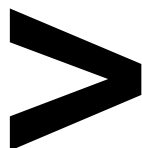
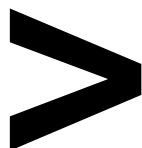


Table 1.2 - BOS compliance with offset strategy checklist

Recommendation	Page/Section Addressed in this Strategy
1. The strategy includes an Approval Holder Declaration signed by the approval holder (not consultant/agent).	Page 2
2. The strategy includes an executive summary which states the relevant approval conditions, outlines the objective/s of the strategy, the primary measures to achieve the strategy's objectives and key residual risks/barriers to achieving the strategy's objectives.	Page 3
3. The offset strategy implements the EPBC Offset Policy and Offsets Assessment Guide. The strategy must justify user inputs to the guide, including: a) for context, outline the attributes of each of the: - condition classes for each ecological community; - condition classes used to determine the species habitat (stocking rate, site context, site condition); b) correlate the impact site/s, and current and proposed future condition classes of the offset site/s, with the above categories; c) identify quantifiable ecological improvements to the offset site/s to meet the future condition. d) provide scientific evidence or agreement² that substantiates the time until ecological benefit and confidence in result values used in the offset guide; and e) substantiate risk of loss values used in the offset guide.	Section 5.2
4. The strategy describes the proposed offset properties, including nature, location, tenure, connectivity, capacity to meet multiple offset requirement and potential for inclusion in the nature conservation reserve system.	Chapter 4
5. The strategy includes a schedule of conservation commitments required to establish and manage the offset site/s, and to monitor the effectiveness of interventions to achieve future condition. The schedule includes: a) a process and timeframes for securing, under legally binding instrument, the offset site/s for biodiversity conservation purposes, in perpetuity; b) an outline of the short, medium and long term management arrangements for the offset site/s in order to achieve future condition commitments; c) commitments to engage qualified ecologists/appropriate experts to conduct ecological monitoring, survey and performance evaluation activities; and d) commitments to an approach to monitoring and detecting change in environmental condition due to offset management actions, that accounts for climatic variability, and that is capable of demonstrating attainment of proposed future condition (completion criteria).	Chapter 6 and refer to the approved Biodiversity Areas Management Plan (Chapters 5 and 6)



Recommendation	Page/Section Addressed in this Strategy
6. The strategy assesses the risk of failure to achieve the offset objectives. The strategy: a) identifies unplanned events or circumstances that prejudice attainment of the proposed offset objectives. The events or circumstances include legal and land planning factors; b) includes a qualitative assessment of the likelihood and consequence of those events or circumstances and, assuming management measures will be implemented, the residual risk of failure to achieve those objectives; c) characterising risk as low, medium, high or severe, and derived from likelihood (highly likely, likely, possible, unlikely, rare) and consequence (minor, moderate, high, major and critical); and d) explaining how conclusions about risks (consequence, likelihood, risk level) have been reached.	Chapter 7
7. The strategy manages the risk of failure by: a) specifying values or circumstances that will trigger contingency response/corrective actions; b) describing corrective actions that are likely to be effective and appropriate; and c) ensuring adequate corrective actions are proposed to avoid a high or severe risk.	Section 7.2
8. The strategy specifies reporting commitments, including: a) who the report is provided to; b) where applicable, reporting to the Department required by the conditions of approval; c) annual performance reports, realisation of key risks, incidents, non-compliance and implementation of corrective actions.	Chapter 8 and refer to the approved Biodiversity Areas Management Plan (Chapter 2)
9. The strategy specifies accountabilities for implementing offset measures, including corrective actions.	Refer to the approved Biodiversity Areas Management Plan (Chapter 2)
10. The strategy includes maps, plans, figures, images and sections to show the offset sites in a state and regional context, and a) are scaled to enable the reader to identify, based on local landmarks (trees, fences, structures) the location of features being shown on the map etc; b) include appropriate standard metric scales to represent the information (for example 1:25 000, 1:10 000 and 1:5000). Datum – plans and cross sections refer to AHD; c) have metric measurements, graphic bar scales, local grid lines and standards and north point or orientation of sections (include a key) are used throughout; and d) include title blocks in the lower right hand corner with the following information: EPBC number and project name, title and number of the strategy, author, scale, date, source and date of data.	Figure 4.1 to 4.6
11. The strategy cites recognized scientific or statutory literature that support the effectiveness of the strategy to achieve its objectives, e.g. scientific papers, published guidelines, recovery plans, conservation advices.	Chapter 9
12. The strategy uses the terms 'will' and 'must' when committing to strategy actions, instead of 'where possible', 'as required', 'to the greatest extent possible', 'should' or 'may'.	Chapter 6 and 7

Recommendation	Page/Section Addressed in this Strategy
13. The footer or header of each page of the strategy states the name of the project, the date of the strategy and sequential page numbering.	Throughout
14. The strategy includes a glossary of terms, acronyms, terms open to different interpretations or not in common use, technical or defined in the approval conditions.	Page 6
15. The strategy includes implementation, risk assessment and contingency and reporting schedules prepared in accordance with Appendix A.	Section 6.4 and Chapter 7



2 Unavoidable Loss and Offset Obligation

Unavoidable biodiversity loss of the action comprises:

- 61 ha of CHVEFW;
- 68.4 ha of Regent Honeyeater habitat;
- 68.1 ha of Swift Parrot habitat; and
- 105.3 ha of Green and Golden Bell Frog habitat.

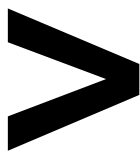
To address the actions impact on CHVEF and the Swift Parrot, the final approval decision notice requires that land is secured at the Wandewoi, Hook and Mitchelhill BAs. A breakdown of the minimum requirement is outlined in Condition 4 as discussed in Section 1.

The quantum of offsets described by Condition 4 will be covered by:

- 236.8 ha of CHVEFW (including derived native grassland (DNG)) and 236.8 ha Swift Parrot habitat (including DNG) at the Wandewoi BA,
- 133.3 ha CHVEFW at the Mitchelhill BA, and
- 109 ha of CHVEFW (including regeneration and DNG) and 121.5 ha of Swift Parrot habitat at the Hook BA.

The action's residual impacts on the Regent Honeyeater and Green and Golden Bell Frog habitat will be compensated through the provision of habitat within the Mitchelhill, Condon View and Crescent Head offset sites.

Chapter 3 of the BOS describes how direct offset sites have been identified that will compensate for the action's residual significant impacts on CHVEFW, Swift Parrot, Regent Honeyeater and Green and Golden Bell Frog. Chapter 4 demonstrates the proposed offset sites' compliance with the EPBC Act Environmental Offset Policy (DSEWPaC 2012a) and Chapter 6 describes how the proposed offset sites will be secured under a legally binding agreement.



3 Offset Identification

3.1 Overview

The process to identify direct offset sites for CHVEFW, Swift Parrot, Regent Honeyeater and Green and Golden Bell Frog includes two stages. These comprise:

Stage 1:

- GIS analysis to identify potentially suitable land; and
- subsequent approach to the landowners to determine their willingness to engage with HVO.

Stage 2:

- verification of site values;
- assessment of site values against the EPBC Offset Assessment Guide; and
- negotiation of terms for an agreement or purchase.

The staged identification process is detailed in the following sections.

3.2 Stage 1

3.2.1 Central Hunter Valley Eucalypt Forest and Woodland CEEC

Stage 1 commenced in February 2016 and concluded in November 2016. GIS datasets (DoE 2015; Peake 2006, OEH 2012) were analysed to identify the likely distribution of CHVEFW across its distribution. Privately-owned land parcels within the distribution of CHVEFW were then identified using GIS.

In excess of 140 private properties were identified as potentially containing CHVEFW. However, only 10% were large enough (100 ha or greater) to provide an economically viable offset in terms of ongoing management. Fourteen such properties were identified from this analysis. An external agent was engaged to approach landowners to determine their willingness to enter into a contractual agreement or potentially sell their land. The list was refined to landowners willing to enter into a contract and/or provide access for surveys during Stage 2.

On review of the Greater Hunter vegetation mapping (OEH 2016), the Hook property was identified as supporting four native vegetation communities. These were Narrow-leaved Ironbark/Bull Oak/Grey Box shrub and grass open forest of the central and lower Hunter; Spotted Gum/Narrow-leaved Ironbark/Red Ironbark shrub and grass open forest of the central and lower Hunter, Spotted Gum/Narrow-leaved Ironbark and Spotted Gum/Red Ironbark/Narrow-leaved Ironbark/Grey Box shrub and grass open forest of the lower Hunter. Three of these vegetation communities were recognised as likely to meet the CHVEFW listing criteria, and field validation was undertaken to confirm the presence of CHVEFW and its extent across the Hook property.

3.2.2 Swift Parrot

A desktop assessment was undertaken to identify the presence of vegetation communities and the likelihood that the Wandewoi BA and Hook BA contains suitable foraging habitat for Swift Parrots. The presence of Swift Parrot records in the area were also evaluated from various databases to identify any local sightings and support an assessment of the likelihood the species could utilise the site for foraging. There are a number of records of Swift Parrot to the south-east of Hook property (within 3 km) and further south in proximity to Werakata National Park (within approximately 10 km).

3.2.3 Regent Honeyeater

A previous study (Cumberland Ecology 2015) and regional vegetation mapping (OEH 2012) were reviewed for land adjacent to the Condon View BA (Figure 4.2) to determine its potential suitability as an offset for the Regent Honeyeater. Atlas of NSW Wildlife (OEH 2016) records were reviewed for sites on the refined list of landowners with potential for CHVEFW on their properties, to determine local occupation patterns of the Regent Honeyeater, and the potential for these sites to provide a suitable Regent Honeyeater offset.

3.2.4 Green and Golden Bell Frog

A desktop study was completed (EMM 2016) to identify potential offset sites for the Green and Golden Bell Frog across NSW. The desktop study considered the following resources:

- Atlas of NSW Wildlife (OEH 2016) records;
- Management Plan: The Green and Golden Bell Frog Key Populations within the Crookhaven River Floodplain (DECC 2007); and
- Green and Golden Bell Frog Recovery Plan (Draft) (DEC 2005).

Sixteen broad areas were identified for further investigation, which were adjacent to key Green and Golden Bell Frog populations and/or had large aggregations of Green and Golden Bell Frog records on the Atlas of NSW Wildlife. These land parcels were considered likely to contain potential breeding (wetlands, swamps) and foraging (adjacent grasslands) habitat for the Green and Golden Bell Frog. An external agent was engaged to approach landowners within these areas to determine their willingness to enter into a contractual agreement or potentially sell their land. The list was refined to landowners willing to enter into a contract and/or provide access for surveys during Stage 2

3.3 Stage 2

Preliminary surveys were conducted by EMM ecologists at potentially suitable properties, to determine if they contained CHVEFW, or Swift Parrot, Regent Honeyeater or Green and Golden Bell Frog habitat.

HVO then selected the Mitchelhill, Condon View and Crescent Head offset sites (described in Chapter 4) based on the results of the preliminary surveys, an assessment of land values and the practicality of ongoing management that would be required. Surveys were completed at these sites to determine the extent of CHVEFW, habitat for the Swift Parrot and Regent Honeyeater, and targeted surveys and habitat assessment for the Green and Golden Bell Frog.

To facilitate the inclusion of the Hook BA in the offset package, EMM undertook initial surveys of each property to determine the value of the site for CHVEFW and Swift Parrot. Umwelt ecologists undertook specific BBAM vegetation surveys of the Hook BA to collect vegetation condition data to guide the metrics entered into the Offset Assessment Guide (DSEWPac 2012b).

Following the completion of surveys, the Offset Assessment Guide (DSEWPac 2012b) was completed for each of the properties to determine the percentage of direct offset provided for CHVEFW, Swift Parrot, Regent Honeyeater and Green and Golden Bell Frog.

4 Proposed Offset Properties

4.1 Overview

Six suitable offset properties were identified, comprising:

- Mitchelhill BA (Figure 4.1);
- Condon View BA (Figure 4.2);
- Crescent Head (north) (Figure 4.3);
- Crescent Head (south) (Figure 4.4);
- Wandewoi (Figure 4.5); and
- Hook (Figure 4.6)

The nature, location, tenure, connectivity, capacity to meet the action's offset requirements and the potential for inclusion in the nature conservation reserve system of these proposed offset properties are described in the following sections.

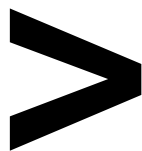
4.2 Offset Properties

4.2.1 Mitchell Hill BA

Mitchelhill BA is a HVO-owned property in Muscle Creek, approximately 6 km south- east of Muswellbrook (Figure 4.1). The property contains CHVEFW and habitat for the Regent Honeyeater. It is proposed that Mitchelhill BA is used to provide the residual offset for CHVEFW and a portion of the residual offset for the Regent Honeyeater. Table 4.1 describes the site's values, its capacity to meet the action's offset requirements and potential for inclusion in the nature conservation reserve system.

Table 4.1 - Description of site values at Mitchelhill BA

Attribute	Description
Current site use	The site contains a large area of woodland. Parts of the site have been cleared for grazing. Cattle grazing occurred at the site until the purchase as an environmental offset was completed.
Description of CHVEFW	The site is located in the Hunter River catchment of the Hunter Valley. The vegetation is located on low hillslopes and not alluvial plains and has a woodland structure with a projected canopy cover of greater than 10%. The vegetation is dominated by key diagnostic species including Narrow-leaved Ironbark (<i>Eucalyptus crebra</i>), Grey Box (<i>E. moluccana</i>) and/or Spotted Gum (<i>Corymbia maculata</i>). The community has a sparse shrub layer comprising Blackthorn (<i>Bursaria spinosa</i>) and Mock Olive (<i>Notelaea microcarpa</i> var. <i>microcarpa</i>), and an understorey comprising a variety of native grasses and forbs. CHVEFW is in good condition at the site, with few weeds observed during surveys. In consideration of the above, vegetation at the site satisfies the key diagnostic characteristics in Section 1.5.1 of the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015). The site contains 135.4 ha of CHVEFW allocated to EPBC 2016/7640 (132.0 ha allocated to Regent Honeyeater and CHVEFW, plus the additional 3.4 ha allocated to CHVEFW), shown on Figure 4.1.
Description of habitat values for the Regent Honeyeater	CHVEFW is present at the site. Section 1.4 of the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015) recognises the community as containing an important source of winter-flowering eucalypts for the Regent Honeyeater. In addition,



Attribute	Description
	the National Recovery Plan for the Regent Honeyeater recognises areas containing Ironbark in the Hunter Valley as important foraging habitat for the species, and identifies Spotted Gum as a key nectar-producing tree for the Regent Honeyeater. The survey confirmed the presence of important foraging habitats for the Regent Honeyeater, comprising CHVEFW, Ironbark and Spotted Gum trees. The site is within approximately 30 km of the Hunter Valley key breeding area, as identified in the National Recovery Plan for the Regent Honeyeater (DoE 2016). The site also contains mature trees with rough bark (Ironbarks) that are identified in the National Recovery Plan for the Regent Honeyeater as a species in which Regent Honeyeaters can build their nests. Given the above, it is possible that breeding may occur within the site.
Threatening processes in operation	The key threat to CHVEFW and Regent Honeyeater habitat across their distributions is land clearing and fragmentation. Parts of Mitchelhill BA have been cleared previously for agricultural uses. These land uses commenced prior to the EPBC Act in 2000 and, therefore, could continue without approval under the act. Land clearing has occurred previously at the site for agriculture. Clearing of CHVEFW can also occur if it is an allowable activity under the NSW <i>Local Land Services Act 2013</i> (LLS Act) as parts have regrown since 1990. Protection of the site under a legally binding mechanism will prevent future clearing of CHVEFW for agriculture and improve its condition through weed control and stock management.
Capacity to meet the action's offset requirements	The site is likely to contain habitat critical to the survival of the Regent Honeyeater in accordance with Section 3.4.6 of the National Recovery Plan for the Regent Honeyeater, (DoE 2016) as it contains potential breeding and foraging habitat in an area where the species is likely to occur. The site provides 135.4 ha of vegetation consistent with the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015). CHVEFW at the site will be protected by implementation of a legally binding mechanism that prevents further vegetation clearing in the 135.4 ha and its condition will be improved over time through weed control and stock management. The site provides 135.4 ha of vegetation likely to provide foraging habitat for the Regent Honeyeater given: • the presence of CHVEFW, identified as containing important Regent Honeyeater habitat in the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015); • the presence of Ironbarks, identified as potential nesting habitat in the National Recovery Plan for the Regent Honeyeater (DoE 2016); and • the presence of Spotted Gums, identified as a key nectar-producing species in the National Recovery Plan for the Regent Honeyeater (DoE 2016).
Potential for inclusion in conservation reserve system	Mitchelhill BA is not located adjacent to a national park or nature reserve, and therefore cannot be added to an existing conservation reserve. National parks and nature reserves are usually established at a minimum size of 500 ha, and therefore it would not be appropriate to reserve the 135.4 ha of land at Mitchelhill BA. Mitchelhill BA would form part of a protected network of biodiversity areas owned by HVO across NSW.



Vegetation communities and offsets at the Mitchelhill (West) Biodiversity Area

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Figure 4.1



4.2.2 Condon View BA

Condon View BA is located approximately 4 km west of Putty (Figure 4.2). The former Commonwealth Department of the Environment (now DCCEEW) approved use of the western part of Condon View BA as an offset for the Regent Honeyeater and Swift Parrot in relation to the Warkworth Continuation Project (EPBC 2009/5081). With regards to this Strategy, the eastern part of Condon View BA is proposed as an offset for the Regent Honeyeater and has been subdivided from the offset for the Warkworth Continuation Project.

Table 4.2 describes the site's values, its capacity to meet the action's offset requirements and potential for inclusion in the nature conservation reserve system.

Table 4.2 - Description of site values at Condon View BA

Attribute	Description
Current site use	The Condon View property has been dedicated as an offset site. The Commonwealth Department of the Environment approved the use of the western part of Condon View BA as an offset for the Regent Honeyeater and Swift Parrot in relation to the Warkworth Continuation Project. The property has been subdivided to enable HVO to dedicate the eastern part of Condon View BA as an offset for the Regent Honeyeater in relation to the HVO State-approved mining project (Figure 4.2). The HVO BA contains native vegetation with sections subject to logging some time ago. The site borders the Wollemi National Park and, with the inclusion of the offset lands dedicated to the Warkworth Continuation Project (EPBC 2009/5081), extends the environmental values of the national park and enlarges the network of protected Regent Honeyeater habitats in the locality.
Description of habitat values for the Regent Honeyeater	The site contains Broad-leaved Ironbark (<i>E. fibrosa</i>) and Narrow-leaved Stringybark (<i>E. eugenioides</i>), that are recognised in the National Recovery Plan for the Regent Honeyeater (DoE 2016) as regionally important foraging resources that support regular Regent Honeyeater breeding events. The Capertee Valley is recognised as a key breeding area in the National Recovery Plan for the Regent Honeyeater (DoE 2016). The site is east of the Capertee Valley, and is connected via large tracts of native vegetation in Wollemi National Park. Therefore, the site is connected to a key breeding area for the Regent Honeyeater. The site is intersected by several waterways that contain mature Rough-barked Apple (<i>Angophora floribunda</i>) trees. The National Recovery Plan for the Regent Honeyeater (DoE 2016) identifies that Regent Honeyeaters have been recorded nesting in Rough-barked Apple trees. Given the proximity to a known breeding area, the presence of tree species that Regent Honeyeaters have been recorded nesting in and the previous record of the Regent Honeyeater from the site, it is highly likely that breeding could occur within the site. The Regent Honeyeater was recorded within the HVO offset area in 1996 (Figure 4.2). Scattered records exist between 1992 and 2000 east of the site, extending into Yengo National Park. There are a number of records from the Regent Honeyeater breeding area in Glen Davis (Capertee Valley), west of the site. Therefore, the site may represent a stepping stone in a dispersal corridor for the Regent Honeyeater from breeding habitat west of Wollemi National Park through to non-breeding habitat in Yengo National Park.
Capacity to meet the action's offset requirements	The site is likely to contain habitat critical to the survival of the Regent Honeyeater in accordance with Section 3.4.6 of the National Recovery Plan for the Regent Honeyeater (DoE 2016) as it contains potential breeding and foraging habitat in an area where the species has been recorded. The site will be protected under a legally binding mechanism that will prevent key threats comprising future habitat clearing and fragmentation.

Attribute	Description
Potential for inclusion in conservation reserve system	Condon View BA adjoins the Wollemi National Park, and has the potential for inclusion in the conservation reserve system, should the proponent wish to do this in the future. Condon View BA forms part of a protected network of biodiversity areas owned by HVO across NSW.



Vegetation communities and offsets at the Condon View Biodiversity Area

Biodiversity Offset Strategy 2024: EPBC 2016-7640

Figure 4.2



4.2.3 Crescent Head (North)

Crescent Head (north) is a HVO-owned property, approximately 16 km east of Kempsey (Figure 4.3). The property contains habitat for the Green and Golden Bell Frog. It is proposed that Crescent Head (north) is used to provide a portion of the residual Green and Golden Bell Frog offsets for the action with the remainder met by Crescent Head (south). Table 4.3 describes the site's values, its capacity to meet the action's offset requirements and potential for inclusion in the nature conservation reserve system.

Table 4.3 - Description of site values at Crescent Head (North) BA

Attribute	Description
Current site use	Prior to purchase, this site was for sale and had development approval to build a property which would likely result in loss of potential foraging habitat for the species.
Description of habitat values for the green and golden bell frog	The site is dominated by swamp sclerophyll forest with smaller patches of littoral rainforest on areas of higher relief. Cleared areas occur along tracks and around the periphery of the site; these include a mixture of native grassland, pasture grasses and sedgeland areas. Weed species include Small-leaved Privet (<i>Ligustrum sinense</i>). The majority of the site is likely to provide suitable foraging habitat for the Green and Golden Bell Frog as there is a high diversity of native flora species and likely a corresponding diversity and abundance of invertebrate prey. One large permanent dam exists within the property, with the Cape Waterlily (<i>Nymphaea capensis</i>) present throughout. Emergent vegetation was limited to small patches of dense Spike Rush species (<i>Eleocharis</i> sp.), with no submerged aquatic species observed. No tadpoles or frogs of any species were observed, and the dam was found have a very high abundance of the exotic Mosquito Fish (<i>Gambusia holbrooki</i>). It is likely that the presence of the Mosquito Fish will substantially reduce or eliminate successful Green and Golden Bell Frog breeding within the dam, particularly as there are limited aquatic refuge areas. Furthermore, the dam is likely to be a permanent resource with the population of Mosquito Fish also correspondingly permanent. A cluster of records occur within 2 to 5km of the site (refer to Figure 4.3). It is likely that this population is extant and utilises dune swales for breeding. Given the close proximity of this population it is likely that Green and Golden Bell Frog may forage within the site, albeit intermittently. This is supported by the 2018/19 monitoring results which identified two Green and Golden Bell Frog individuals within the fringing vegetation on site, and the five individuals recorded in 2022 utilising the HVO-installed frog ponds.
Threatening process in operation	Predation by <i>Gambusia holbrooki</i> (Mosquito Fish) is listed as a key threatening process under the NSW <i>Biodiversity Conservation Act 2016</i>. Although this process is not listed under the EPBC Act, it is directly relevant to the suitability of potential Green and Golden Bell Frog offset sites given its link to the decline of the species. The Mosquito Fish is a small freshwater fish originally introduced into Australia in the 1920s. It was originally imported as an aquarium fish, however some were released into creeks around Sydney, Melbourne and Brisbane. The Mosquito Fish is now widespread in NSW and is an aggressive and voracious predator of native fauna, particularly the eggs and tadpoles of frogs. Presence of the Mosquito Fish has been linked to the decline of the Green and Golden Bell Frog. Breeding by the Green and Golden Bell Frog is almost completely restricted to water bodies lacking Mosquito Fish (NSWSC 1999). Mosquito Fish were abundant in dams and waterways of this property, and therefore would likely prevent successful Green and Golden Bell Frog breeding.

Attribute	Description
Capacity to meet the action's offset requirements	The site is likely to provide foraging habitat for the Green and Golden Bell Frog given the presence of native vegetation and good connectivity to a population of the species. Breeding resources for the species are likely to be hampered by very abundant Mosquito fish. Management actions to improve the site could include planting of emergent vegetation and submerged vegetation, whilst controlling the Mosquito Fish, or constructing potential breeding ponds that would be free from Mosquito Fish.
Potential for inclusion in conservation reserve system	Crescent Head (north) is directly west of Hat Head National Park, and therefore there is potential for inclusion in the conservation reserve system, should the proponent wish to do this in the future. Crescent Head (north) would form part of a protected network of biodiversity areas owned by HVO across NSW.



Green and Golden Bell Frog habitat and offset at the Crescent Head (North) Biodiversity Area

Biodiversity Offset Strategy 2024: EPBC 2016-7640

Figure 4.3

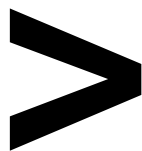


4.2.4 Crescent Head (South)

Crescent Head (south) is a HVO-owned property, approximately 18 km north of Port Macquarie. The property contains habitat for the Green and Golden Bell Frog. It is proposed that Crescent Head (south) is used to provide a portion of the residual Green and Golden Bell Frog offsets for the proposed action. Table 4.4 describes the site's values, its capacity to meet the proposed action's offset requirements and potential for inclusion in the nature conservation reserve system.

Table 4.4 - Description of site values at Crescent Head (South) BA

Attribute	Description
Current site use	Parts of this site have been historically cleared with a tea tree plantation in the north of the site. The site does not appear to be currently utilised for any agriculture. It remains unknown whether any development or other actions were proposed for this site prior to purchase as an environmental offset.
Description of habitat values for the green and golden bell frog	The southern half of the site is dominated by coastal heath swamp with the northern half a mosaic Pink Bloodwood -Blackbutt Shrubby Open Forest. Patches of Tea Tree (<i>Leptospermum</i> sp.) and derived grassland also occur with exotic grass, such as <i>Sporobolus</i>, also present. The majority of the site is likely to provide suitable foraging habitat for the Green and Golden Bell Frog, with a range of microhabitats present including woody debris, dense vegetation and more open areas for basking. Potential breeding habitat included six dams which were scattered within the northern half of the site. Three of the dams contain permanent water with vegetation including the Cape Waterlily, several species of Spike Rush and other sedge species. Submerged aquatic species were also present. The Mosquito Fish were present in all of the permanent dams; however the abundance observed was low compared to Crescent Head (north). There was also a much higher vegetation complexity which may provide a refuge for tadpoles. Three of the dams were dominated by dense Spike Rush and contained very shallow water. These dams are likely to dry occasionally. Whilst these appear to provide less optimal breeding habitat for the Green and Golden Bell Frog, owing to the lack of open water areas they may provide semi-permanent/ephemeral breeding areas with reduced predation from Mosquito Fish. No tadpoles were observed in any of the dams despite dip netting and visual searches around the periphery of all dams during both diurnal and nocturnal periods. Moderate abundances of the Dwarf Green Tree Frog (<i>Litoria fallax</i>) were found resting of emergent vegetation; however calling was subdued to non-existent. The Broad Palmed Frog (<i>Litoria latopalmata</i>) was also observed in terrestrial habitats both during the day and night, with none heard calling. The site visit was preceded by a prolonged dry period and the water levels within the dams were lower than typical, judging from the vegetation compositions. It is likely that the surveys were not conducted when frogs were actively breeding within the site, and therefore difficult to detect. The closest record is 2 km to the south-east from 2005. The record states that evidence of breeding was recorded. The location of the record is well connected to the Crescent Head (south) property with continuous vegetation and no barriers to Green and Golden Bell Frog movement. Furthermore, survey effort is likely to be low in this region given the lack of development and more Green and Golden Bell Frog populations may occur within the locality.



Attribute	Description
Threatening process in operation	Predation by <i>Gambusia holbrooki</i> (Mosquito Fish) is listed as a key threatening process under the NSW <i>Biodiversity Conservation Act 2016</i>. Although this process is not listed under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>, it is directly relevant to the suitability of potential Green and Golden Bell Frog offset sites given its link to the decline of the species. The presence of Mosquito Fish in several of the dams may lower the habitat value of the site. However, there is still the potential that successful breeding may occur due to the other otherwise optimal nature of the habitat, and refuge areas present. There is also the potential that breeding may occur in the more ephemeral dams in which Mosquito Fish are likely to be periodically eliminated by wetting and drying cycles.
Capacity to meet the action's offset requirements	The site is likely to provide foraging habitat for the Green and Golden Bell Frog given the presence of native vegetation and good connectivity to a population of the species. It is unclear whether Green and Golden Bell Frogs are breeding within in the study area and further work is likely to be required to determine this. The presence of Mosquito Fish in several of the dams may lower the habitat value; however there is still the potential that successful breeding occurs due to the other otherwise optimal nature of the habitat, and refuge areas present. There is also the potential that breeding may occur in the more ephemeral dams in which Mosquito Fish are likely to be periodically eliminated.
Potential for inclusion in conservation reserve system	Crescent Head (south) is directly north of Limeburners Creek National Park, and therefore there is potential for inclusion in the conservation reserve system, should the proponent wish to do this in the future. Crescent Head (south) would form part of a protected network of biodiversity areas owned by HVO across NSW.



Green and Golden Bell Frog habitat and offset at the Crescent Head (South) Biodiversity Area

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Figure 4.4

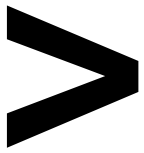


4.2.5 Wandewoi BA

Wandewoi is a HVO-owned property, approximately 2 km northeast of Jerrys Plains and is located within 2 km of HVO. The property contains potential foraging habitat for the Swift Parrot and substantial areas of CHVEFW. Table 4.5 describes the site's values, its capacity to meet the proposed action's offset requirements and potential for inclusion in the nature conservation reserve system.

Table 4.5 - Description of site values at Wandewoi BA

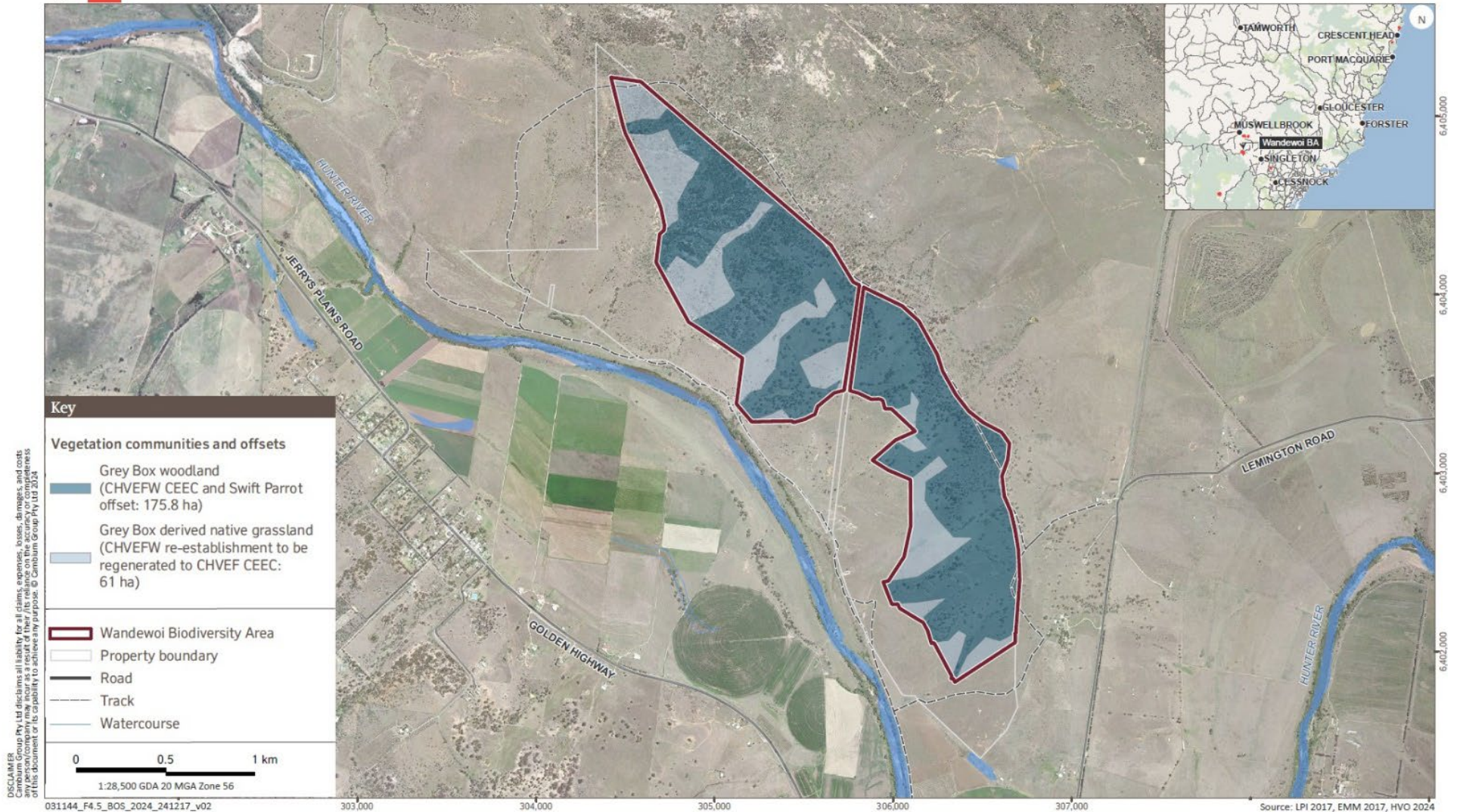
Attribute	Description
Current site use	Prior to designation as an environmental offset, the Wandewoi site was a grazing property containing fragmented woodland areas within a primarily agricultural landscape.
Description of habitat values for the CHVEFW CEEC	The site is located in the Hunter River catchment of the Hunter Valley. The Grey Box Woodland vegetation is located on low hillslopes and has a woodland structure with a projected canopy cover of greater than 10%. The derived native grassland areas is showing signs of canopy species recruitment and is likely to regenerate to the CHVEFW. The vegetation is dominated by key diagnostic species including Grey Box (<i>E. moluccana</i>). The community has a sparse shrub layer comprising Cooba (<i>Acacia salicina</i>), buloke (<i>Allocasuarina luehmannii</i>), and an understorey comprising a variety of native grasses and forbs. CHVEFW is in good condition at the site, with few weeds observed during surveys. In consideration of the above, vegetation at the site satisfies the key diagnostic characteristics in Section 1.5.1 of the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015). The site contains 175.8 ha of woodland CHVEFW and up to 61 ha of grassland proposed to be restored to CHVEFW, as shown on Figure 4.5.
Description of habitat values for the swift parrot	CHVEFW is present at the site. Section 1.4 of the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015) recognises the community as containing an important source of winter-flowering eucalypts for the swift parrot.
Threatening process in operation	The key threat to CHVEFW and Swift Parrot habitat across their distributions is land clearing and fragmentation. Parts of Wandewoi BA have been cleared previously for agricultural uses with grazing having occurred on the site. Clearing and agricultural use of the land commenced prior to the EPBC Act in 2000, and therefore could continue without approval under the act. Clearing of CHVEFW can also occur if it is an allowable activity under the NSW <i>Local Land Services Act 2013</i> (LLS Act) as sections have regrown since 1990. Protection of the site under a legally binding mechanism will prevent future clearing of CHVEFW for agriculture and improve its condition through weed control and stock management.
Capacity to meet the action's offset requirements	The site contains potential winter mainland foraging habitat in accordance with the National Recovery Plan for the Swift Parrot (Saunders and Tzaros 2011). The site provides 175.8 ha of vegetation consistent with the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015). CHVEFW at the site will be protected by implementation of a legally binding mechanism that prevents further vegetation clearing and its condition will be improved over time through weed control and stock management.
Potential for inclusion in conservation reserve system	Wandewoi BA is not located adjacent to a national park or nature reserve, and therefore cannot be added to an existing conservation reserve. Its location is currently surrounded by agricultural land, and the Wandewoi BA would form part of a protected network of biodiversity areas owned by HVO across NSW.



Vegetation communities and offsets at the Wandewoi Biodiversity Area

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Figure 4.5



4.2.6 Hook BA

The Hook property is located on Pothana Lane, Belford NSW and is 157.6 ha in size. The property is freehold and owned by HVO. The property is located in the Hunter Valley region approximately 20 km to the east of HVO's mine and associated impact areas.

Table 4.6 - Description of site values at Hook BA

Attribute	Description
Current site use	The Hook BA was historically used for grazing of livestock and some large trees have been selectively logged for timber. The majority of the property is covered in open eucalypt woodland with patches of cleared land. Some areas are showing signs of natural regeneration with the land being occasionally grazed prior to the purchase of the property in 2016. The site currently excludes grazing and is being maintained for conservation according to the strategies for the other BAs, pending acceptance by the Department. The site is located in proximity to significant rural residential development including the expanding town of Huntlee 3.5 km to the east. The Hunter Expressway is also expected to lead to an increase in residential development and migration to the area.
Description of habitat values for the CHVEFW CEEC	Vegetation community surveys confirmed the Hook BA supports large areas of eucalypt woodlands of reasonable maturity and moderate ecological condition that conform to the CHVEFW. The majority of woodlands are dominated by spotted gum, grey box and narrow-leaved ironbark. This community has been cleared or thinned historically as, while large canopy trees are present, the majority of canopy trees have a diameter at breast height (DBH) of 20-30cm. 78.1 hectares of woodland CHVEFW consists of maturing eucalypt forest and woodland areas in the property. 28.3 ha of regenerating woodland consists of areas showing signs of natural regeneration including canopy species consistent with CHVEFW criteria. 2.6 ha of derived native grasslands also occurs on the site and is considered likely to conform to the CHVEFW following targeted management and improvement actions.
Description of habitat values for the swift parrot	The Hook BA is situated in the Hunter Valley region, which is an area known to support the Swift Parrot and contains its preferred foraging habitat including spotted gum and grey box. On the mainland, the Swift Parrot inhabits dry sclerophyll eucalypt forests and woodlands, in particular, temperate box ironbark woodlands; and also in forests of forest red gum (<i>Eucalyptus tereticornis</i>), swamp mahogany (<i>E. robusta</i>) and spotted gum (<i>Corymbia maculata</i>) in coastal New South Wales/Queensland. The Hook property contains vegetation dominated by spotted gum and areas containing forest red gum, which are key feed resources for the species according to the National Recovery Plan for the Swift Parrot (Saunders and Tzaros 2011). Based on database searches there are a number of records of Swift Parrot to the south-east of Hook property (within 3 km) and further south in proximity to Werakata National Park (within approx. 10 km).
Threatening process in operation	The key threat to CHVEFW and Swift Parrot habitat at the Hook BA is the invasion of native plant communities by African olive (<i>Olea europaea</i> subsp. <i>cuspidata</i>). African olive is considered to be one of the most serious invasive species in the Hunter region because of its ability to completely alter ecosystem structure (Peake 2006). African olive is known to fundamentally alter vegetation communities (Cuneo & Leishman 2006) and prevent the regeneration of native species through the formation of a dense mid-canopy that blocks any infiltration of sunlight (NSW Scientific Committee 2011; Peake 2006). Vegetation communities can quickly become altered beyond recognition by this weed, as canopy species senesce and are not replaced. This dense canopy also results in the long-term loss of native species from the soil

Attribute	Description
	seedbank, limiting the ability of native plant communities to naturally regenerate in shrub and ground strata. Clearing habitat across the CHVEFW distribution is also a key threatening process for this community. Parts of Hook BA have been cleared previously for agricultural uses. Protection of the site under a legally binding mechanism will prevent future clearing of CHVEFW for agriculture and improve its condition through weed control and stock management.
Capacity to meet the action's offset requirements	The site contains potential winter mainland foraging habitat in accordance with the National Recovery Plan for the Swift Parrot (Saunders and Tzaros 2011). The site provides 106.4 hectares of vegetation consistent with the Approved Conservation Advice (including listing advice) for Central Hunter Valley Eucalypt Forest and Woodland ecological community (TSSC 2015) and 2.6 hectares of grassland that can be restored to CHVEFW. CHVEFW at the site will be protected by implementation of a legally binding mechanism that prevents further vegetation clearing and its condition will be improved over time through weed control and stock management.
Potential for inclusion in conservation reserve system	While the Hook BA is south of Belford National Park, the New England Highway and a small parcel of private land separates the two locations. It is, therefore, unlikely that the property would be considered for inclusion in the conservation reserve system should the proponent wish to do this in the future. Regardless, the Hook BA would be an important regional stepping stone that includes the Belford National Park, Werakata National Park, the Singleton Military Area and towards the Yengo and Watagans National Parks. The Hook BA would form part of a protected network of biodiversity areas owned by HVO across NSW.

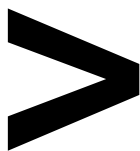


Vegetation communities and offsets at the Hook Biodiversity Area

Biodiversity Offset Strategy 2024: EPBC 2016-7640

Figure 4.6





5 User Inputs and Applying the Offset Guide

5.1 Policy Framework

5.1.1 EPBC Act Environmental Offsets Policy

The EPBC Act Environmental Offsets Policy (DSEWPaC 2012a) outlines the Commonwealth Government's approach to the use of environmental offsets under the EPBC Act. The policy has five key aims. These are to:

1. ensure the efficient, effective, timely, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act;
2. provide proponents, the community and other stakeholders with greater certainty and guidance on how offsets are determined and when they may be considered under the EPBC Act;
3. deliver improved environmental outcomes by consistently applying this policy;
4. outline the appropriate nature and scale of offsets and how they are determined; and
5. provide guidance on acceptable delivery mechanisms for offsets.

For an offset to comply with the policy, it must:

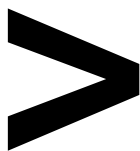
- deliver an overall conservation outcome that improved or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action;
- be built around direct offsets but may include other compensatory measures;
- be in proportion to the level of statutory protection that applies to the protected matter;
- be of a size and scale proportionate to the residual impacts on the protected matter;
- effectively account for and manage the risks of the offset not succeeding;
- be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action);
- be efficient, effective, timely, transparent, scientifically robust and reasonable; and
- have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

The policy requires that offset sites provide a minimum 90% direct offset, with a maximum 10% offset provided by other compensatory measures. Other compensatory measures are those actions that do not directly offset the impacts on the protected matter, but are anticipated to lead to benefits for the impacted protected matter, e.g. funding for research or educational programs.

The policy outlines criteria for the delivery of other compensatory measures, through research programs and educational programs.

Research programs:

1. will be tailored to at least a postgraduate education level, however there will be scope to engage other education levels in educational programs;
2. will present findings that can be peer reviewed;
3. will publish findings in an internationally recognised peer-reviewed scientific journal or be of a standard that would be acceptable for publication in such a journal. Publications should be submitted to free



open access journals. Data and information collected should have creative commons licensing and be free and accessible; and

4. research outputs should inform future management decisions on the protected matter and where possible be readily applicable to other similar matters.

Educational programs:

1. will be likely to vary in scope, mode of delivery and duration according to the target audience and the protected matter (for instance, school or community programs, signage or printed materials);
2. should seek to attain measurable outcomes. Note that it may be difficult to ascertain the scope of influence of educational programs as it can be difficult to link education activities to behavioural change and subsequent improvement in the viability of the protected matter; and
3. should be targeted toward behavioural change and subsequent improvement in the viability of the protected matter.

Other compensatory measures should relate to the impacted aspect of the protected matter. For example, research into effective re-vegetation techniques for a particular ecological community may be an appropriate component of an offsets package for an action that involves clearing of that ecological community.

Compliance of the offset strategy with the policy is addressed in Section 5.2.2. Other compensatory measures for the Green and Golden Bell Frog are discussed in Section 5.2.1 iii.

5.1.2 Offset Assessment Guide

The Offsets Assessment Guide (DSEWPaC 2012b) is a calculation tool that determines the capacity of proposed offset sites to compensate for significant impacts on protected matters. The guide is based on eight variables, comprising:

1. annual probability of extinction - the average chance that a species or ecological community will be completely lost in the wild each year;
2. protected matter attributes - the options provided to calculate offsets, i.e. the area of an ecological community impacted, the area of habitat impacted for a threatened species, or specific protected matter attributes including the number of nest hollows, habitat condition, birth rate, mortality rate and the number of individual plants or animals;
3. quality - comprising site condition (i.e. the condition of habitat relevant to the protected matter), site context (i.e. the level of connectivity relevant to the needs of the protected matter) and species stocking rate (i.e. the number of individuals present and/or the importance of the habitat in the context of the species ecological requirements);
4. time over which loss is averted - the risk of loss with and without conservation of the proposed offset;
5. time until ecological benefits are achieved - the estimated time in years for habitat quality to improve at the proposed offset. This factor considers the future quality of the site with and without conservation of the proposed offset;
6. risk of loss - the chance that habitat at the proposed offset site will be completely lost;
7. confidence in result - the level of certainty about the success of the proposed offset; and
8. net present value - a form of discounting that incorporates the calculations for the annual probability of extinction (1), the time over which loss is averted (4) and the time until ecological benefit (5).

The guide calculates the percentage of direct offset provided by a proposed offset site. A minimum of 90% direct offsets and maximum of 10% indirect offsets are required to adequately compensate for significant impacts, in accordance with the guide and policy.

Compliance of the offset strategy with the guide is addressed in Section 5.2.2.

5.1.3 Determining Confidence Levels

Condition 10d requires that scientific evidence or agreement that substantiates the time until ecological benefit and confidence in result values used in the offset assessment guide is provided in this BOS. The offset assessment checklist (Table 1.2) provides a method for determining the confidence levels for future condition, shown in Plate 5.1.

Confidence levels are determined using a combination of the level of scientific agreement and evidence.

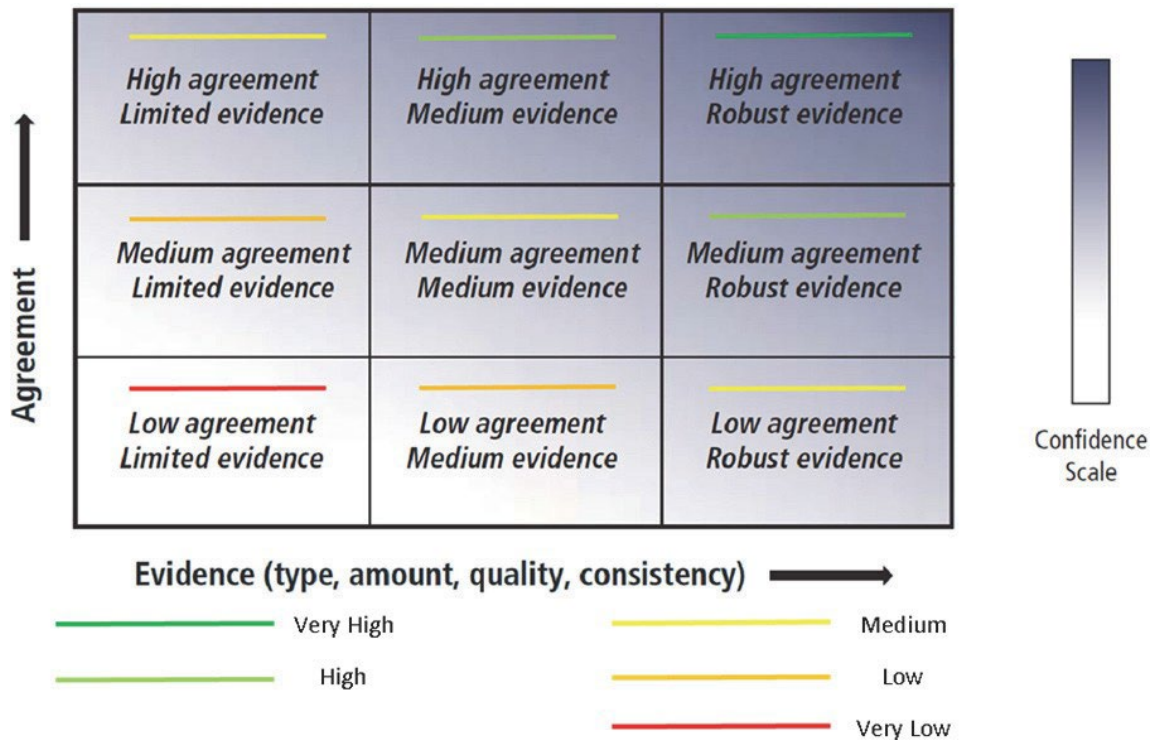


Plate 5.1 Determining confidence levels (source: IPCC 2013)

Guidance is also provided in the offset assessment checklist (Table 1.2) in determining the confidence levels in the desired result, as a percentage (Table 5.1).

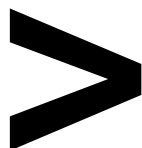


Table 5.1 - Standard terms used to define likelihood (IPCC 2013)

Term	Likelihood of the outcome
Virtually certain	>99% probability
Extremely likely	>95% probability
Very likely	>90% probability
Likely	>66% probability
More likely than not	>50% probability
About as likely as not	33 to 66% probability
Unlikely	<33% probability
Extremely unlikely	<5% probability
Exceptionally unlikely	<1% probability

The guidance in Plate 5.1 and Table 5.1 has been used to determine the confidence for each of the offset calculations provided in Section 5.2.

5.2 Application of the Policy and Guide

5.2.1 Offset Calculations

Offset calculations have been completed in the Offsets Assessment Guide for CHVEFW, Regent Honeyeater, Green and Golden Bell Frog and the Swift Parrot. The calculations and justification for the variables entered are provided in the following sections. The offset calculation spreadsheets are provided in Appendices A to D.

5.2.1.1 Central Hunter Valley Eucalypt Forest and Woodland CEEC

The variables used to perform CHVEFW offset calculations for Mitchelhill, Wandewoi and Hook BAs is provided in Table 5.2. The application of the Offsets Assessment Guide for the Hook property was undertaken using the BBAM (OEH 2014) as guidance for the quality scores for the range of CHVEFW classes (i.e. woodland, regeneration and derived native grasslands). EPBC Offsets Guide spreadsheets are provided in Appendix A and justifications for inputs into the Guide for the Hook property is provided in Appendix E.

Of the 61 ha impact area, the combination of the Wandewoi, Hook and Mitchelhill BAs offset 38.3 ha, while Mitchelhill BA offsets the residual 22.7 ha. Together, these BAs cover the total quantum of impacts and offset 100% of the Class A and Class B CEEC offset requirements.

Table 5.2 below provides a credit calculation summary for the 38.3 ha impact area. The calculations for the residual 22.7 ha can be seen in Appendix A.

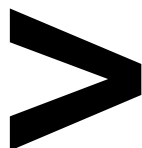


Table 5.2 - Credit calculation summary for CHVEFW

Input parameter/value output	Values		
	Mitchelhill BA	Wandewoi BA	Hook BA
Impact Calculator			
Area of Impact (ha)	22.7 ha	31.7 ha Class A CEEC 6.6 ha Class B CEEC	
Total quantum of impact (ha)	18.16 ha	29.3 ha (25.36 Class A CEEC + 3.96 Class B CEEC)	
Quality (scale 0-10)	8	8 - Class A CEEC (Riverview Pit) 6 - Class B CEEC (West Pit)	
Offset Calculator			
Time over which loss is averted (years)	20 years	20 years	20 years
Time until ecological benefit (years)	10 years	10 years – Woodland 30 years - DNG	10 years – Woodland 20 years – Regeneration 30 years - DNG
Start area (ha)	3.4 ha	175.8 ha – Woodland 61 ha - DNG	78.1 ha – Woodland 28.3 ha – Regeneration 2.6 ha - DNG
Start Quality (scale 0-10)	8 - The site contains a large patch of CHVEFW, which varies from Class A to B high quality condition.	7 – The woodland is in Class A high condition as per the condition classes outlined in the Conservation Advice (patch size is >5 ha and >50% of perennial understorey vegetation is native and the patch contains >12 native understorey species). 5 – The grasslands are in moderate condition, despite not currently conforming to the CEEC. It does not contain a projected canopy cover of greater than 10% with at least 10 native stems per hectare, and it does not contain a canopy.	6 – Woodland 5 – Regeneration 3 – DNG Refer to Appendix E for quality score justifications derived from the BBAM.
Future quality without the offset (scale 0-10)	6 - Cattle grazing occurs at the site. The Approved Conservation Advice for CHVEFW (TSSC 2015) identifies grazing as an activity that can extensively modify the structure and	6 – Without the offset, the ongoing disturbance from cattle grazing, weeds and potential future drought impacts is likely to reduce the quality of the woodland	5 – Woodland 4 – Regeneration 2 – DNG Refer to Appendix E for quality score justifications derived from the BBAM.

Input parameter/value output	Values		
	Mitchellhill BA	Wandewoi BA	Hook BA
	composition of the community. As cattle grazing would continue under the current management regime at the site, the condition of CHVEFW would likely decline	by one point over a 20 year period. 5 - Without the offset, the disturbance from cattle grazing and weeds are likely to retain the existing quality over 20 years.	
Future quality with the offset (scale 0-10)	9 - The implementation of offset management actions would improve the condition of CHVEFW at the site.	8 – Following the application of active management actions to exclude cattle and conduct weed control as well as fencing to reduce unwanted access and disturbance, the woodland is likely to improve its quality by one point over a 10 year period. 8 - Following the application of active management actions to specifically manage weeds as well as supplementary planting and fencing to reduce unwanted access and grazing, the grassland is likely to be restored to CEEC over a 20 year period.	7 – Woodland 7 – Regeneration 5 – DNG Refer to Appendix E for quality score justifications derived from the BBAM.
Risk of loss without the offset (%)	0% - There are no current development applications on the site.	30% - The site is currently zoned RU1 Primary Production and is situated on coal reserves that would require open cut mining to extract. Total loss of the CEEC is possible through clearing for agriculture or for coal extraction (however it is acknowledged that the latter would require suitable State and Commonwealth assessment process for this to occur.)	5% - While there are no specific development proposals stated for the Hook BA there are also no formal protection mechanisms for the property. There is potential for the total loss of the CEEC on the site due to residential development, agricultural, or viticultural expansion. Refer to Appendix E for further detail.

Input parameter/value output	Values		
	Mitchelhill BA	Wandewoi BA	Hook BA
Risk of loss with the offset (%)	0%. In the very unlikely event that the offset was to be lost to future development, it must be offset at an extremely high ratio.	10% - The risk of total loss of the CEEC with an in-perpetuity conservation mechanism and management actions is considered unlikely, however it is acknowledged that mining development could still occur.	0% - The risk of total loss of the CEEC with an in-perpetuity conservation mechanism and management actions is considered exceptionally unlikely.
Confidence in result (%)	Very likely (90%). CHVEFW is existing at the site and is in good condition. This condition will also be improved over time through the implementation of management actions.	80% - High confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the CEEC will be prevented.	100% - Very high confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the CEEC will be prevented.
Net present value (adjusted ha)	0.48	19.39 (16.23 ha Woodland and 3.16 DNG)	9.47 (7.27 ha Woodland, 2.1 ha Regeneration and 0.1 DNG)
% of impact offset	12.01%	64.02% Class A CEEC 79.86% Class B CEEC	28.65% Class A CEEC 55.8% Class B CEEC
TOTAL	12.01% Class B CEEC offset and 0.48 adjusted hectares (net present value)	92.67% Class A CEEC 135.66% Class B CEEC 28.86 adjusted hectares (net present value)	
Confidence levels for future condition			
Degree of scientific agreement (high/medium/low)	High agreement. Appendix E of the Approved Conservation Advice for CHVEFW states that vegetation clearing and landscape fragmentation, invasive flora species and detrimental grazing, mowing and slashing regimes are key threats to the community. The protection of CHVEFW at the site will prevent future vegetation clearing and fragmentation. Management intervention would likely consist of the strategic grazing to improve the condition and extent of native groundcovers, and targeted removal of the scattered weeds that occur. As the control of key threats identified in the Approved Conservation Advice for CHVEFW will be addressed, the degree of scientific agreement is high.		
Degree of evidence (robust/medium/limited)	Robust evidence. The protection and management of CHVEFW at Mitchelhill, Wandewoi and Hook BAs under a legally binding agreement addresses three of the highest recovery priorities identified in Section 4.3.1 of the Approved Conservation Advice for CHVEFW. These comprise: avoidance of further clearance and fragmentation of the ecological community;		

Input parameter/value output	Values		
	Mitchellhill BA	Wandewoi BA	Hook BA
	2. implement effective control and management techniques for invasive species; 3. strategically manage grazing; and 4. regeneration, revegetation and rehabilitation of the ecological community with an appropriate mix of species. Accordingly, there is a robust degree of evidence that the proposed protection and management of CHVEFW at Mitchellhill, Wandewoi and Hook BAs would achieve beneficial outcomes for the community.		
Confidence level (very high/high/medium/low/very low)	Very High.		

5.2.1.2 Regent Honeyeater

The variables used to perform Regent Honeyeater offset calculations for Mitchellhill BA and Condon View BA is provided in Table 5.3. Combined, the sites will provide a 101.32% direct offset for the Regent Honeyeater. EPBC calculations for the Regent Honeyeater are included in Appendix B.

Table 5.3 - Credit calculation summary for Regent Honeyeater

Input parameter/value output	Values	
	Mitchelhill BA	Condon View BA
Impact Calculator		
Area of Impact (ha)	68.4	
Total quantum of impact (ha)	34.2	
Quality (scale 0-10)	5	
Offset Calculator		
Time over which loss is averted (years)	20 years	20 years
Time until ecological benefit (years)	10 years - The aim is to improve the condition of Regent Honeyeater habitat through the implementation of offset management actions.	0 years - The aim is to maintain the- condition of Regent Honeyeater habitat through the protection of existing Regent Honeyeater habitat and improve habitat condition through management.
Start area (ha)	132 ha	168 ha
Start Quality (scale 0-10)	8 - A large area of suitable foraging and breeding habitat for the Regent Honeyeater is present at the site.	9 - A large area of suitable foraging and breeding habitat for the Regent Honeyeater is present at the site.
Future quality without the offset (scale 0-10)	6 - Grazing of livestock has occurred within Regent Honeyeater habitats at Mitchelhill BA. The National Recovery Plan for the Regent Honeyeater (DoE 2016) identifies livestock grazing as an activity that leads to soil compaction, simplification of structural diversity and	8 - No environmental management was undertaken. Parts of the site have been logged in the past, and the site is also adjacent to cleared and recently logged blocks. Without management, these disturbed areas would likely be subject to edge effects including weed invasion

Input parameter/value output	Values	
	Mitchelhill BA	Condon View BA
	restriction of shrub and sapling regrowth, leading to the reduction of suitable habitat quality. Livestock grazing would continue at the site without offsetting, which would cause a decline in habitat quality for the Regent Honeyeater.	and the presence of aggressive native species including the Noisy Miner, which may lead to a decline in the current condition of Regent Honeyeater habitat at the site. The National Recovery Plan for the Regent Honeyeater (DoE 2016) identifies habitat degradation and competition from the Noisy Miner as key threats to the species. Without offset, no management measures would be implemented to address these future threats and maintain the current habitat quality.
Future quality with the offset (scale 0-10)	9 - The implementation of offset management measures (Table 6.2) would improve the condition and increase the area of Regent Honeyeater habitat at the site.	9 - The existing condition of Regent Honeyeater habitat at the site would be maintained through the implementation of management measures (Table 6.2).
Risk of loss without the offset (%)	0% - There are no current development applications on the site.	0% - There are no current development applications or private native forestry approvals on the site, however properties in the immediate vicinity have been recently logged.
Risk of loss with the offset (%)	0% - In the very unlikely event that the offset was to be lost to future development, it must be offset at an extremely high ratio.	0% - In the very unlikely event that the offset was to be lost to future development, it must be offset at an extremely high ratio.
Confidence in result (%)	Very likely (90%). Regent Honeyeater habitat is existing at the site given the presence of CHVEFW and Ironbarks, and this habitat will be improved over time.	Very likely (90%) Regent Honeyeater habitat is existing at the site given the presence of key nectar-producing trees, nesting trees and previous site records. This habitat will be improved over time.
Net present value (adjusted ha)	18.46	16.19
% of impact offset	53.98%	47.34%
TOTAL	101.32% offset and 34.65 adjusted hectares (net present value)	
Confidence levels for future condition		
Degree of scientific agreement (high/medium/low)	High agreement. Habitat loss and fragmentation is recognised as a key threat to the species survival in the National Recovery Plan for the Regent Honeyeater. The protection of Regent Honeyeater habitat at Mitchelhill BA and Condon View BA under a legally binding agreement will prevent future habitat loss and fragmentation for the species. The offset addresses a key threat to the species identified in its recovery plan, and therefore the degree of scientific agreement is high.	
Degree of evidence (robust/medium/limited)	Robust evidence.	

Input parameter/value output	Values	
	Mitchellhill BA	Condon View BA
	The site contains habitat critical to the survival of the species as it contains potential breeding and foraging habitat in an area where the species is likely to occur. Action 1c in the National Recovery Plan for the Regent Honeyeater requires the protection of such areas. The offset addresses a key recovery action for the species identified in its recovery plan, and therefore the degree of evidence is robust.	
Confidence level (very high/high/medium/low/very low)	Very high	

5.2.1.3 Green and Golden Bell Frog

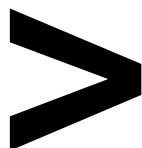
The variables used to perform Green and Golden Bell Frog offset calculations in the Offsets Assessment Guide for Crescent Head (north) and Crescent Head (south) is provided in Table 5.4. Combined, the sites will provide a 99.29% direct offset for the Green and Golden Bell Frog. EPBC Offsets Guide spreadsheets for the Green and Golden Bell Frog are included in Appendix C.

Table 5.4 - Credit calculation summary for Green and Golden Bell Frog

Input parameter/value output	Values	
	Crescent Head (North) BA	Crescent Head (South) BA
Impact Calculator		
Area of Impact (ha)	105.3 ha	
Total quantum of impact (ha)	63.18	
Quality (scale 0-10)	6	
Offset Calculator		
Time over which loss is averted (years)	20 years	20 years
Time until ecological benefit (years)	10 years	10 years
Start area (ha)	52.79 ha	136.71 ha
Start Quality (scale 0-10)	5 - The site contains suitable habitat, however potential breeding habitats are heavily infested with Mosquito Fish.	6 - The site contains suitable habitat, however some areas of potential breeding habitat are infested with Mosquito Fish.
Future quality without the offset (scale 0-10)	4 - The likelihood of Green and Golden Bell Frog breeding events is low under the existing management regime.	5 - The likelihood of Green and Golden Bell Frog breeding events is low to moderate under the existing management regime.
Future quality with the offset (scale 0-10)	7 -The likelihood of Green and Golden Bell Frog breeding events will increase with Mosquito Fish management (Table 6.2).	8 - The likelihood of Green and Golden Bell Frog breeding events will increase with Mosquito Fish management (Table 6.2).

Input parameter/value output	Values	
	Crescent Head (North) BA	Crescent Head (South) BA
Risk of loss without the offset (%)	5% - The site is mostly forested and a permit to build would unlikely result in major losses of habitat.	20%. The site was previously subject to agricultural practices which if to occur again, has potential to cause major habitat losses for the Green and Golden Bell Frog.
Risk of loss with the offset (%)	0% - In the very unlikely event that the offset was to be lost to future development, it must be offset at an extremely high ratio.	0% - In the very unlikely event that the offset was to be lost to future development, it must be offset at an extremely high ratio.
Confidence in result (%)	Very likely (90%) A high confidence level has been determined by combining the degree of scientific agreement and evidence, shown below.	Very likely (90%) A high confidence level has been determined by combining the degree of scientific agreement and evidence, shown below.
Net present value (adjusted ha)	14.87	47.86
% of impact offset	23.54%	75.75%
TOTAL	99.29% offset and 62.73 adjusted hectares (net present value)	
Confidence levels for future condition		
Degree of scientific agreement (high/medium/low)	Medium agreement. The scientific community is in a high level of agreement that the presence of the Mosquito Fish in Green and Golden Bell Frog habitats in NSW has been an important factor in their decline, along with habitat destruction and modification (Mahony 1993; Daly 1995; Morgan 1995; Goldingay 1996; Mahony 1996; Morgan and Buttemer 1996; Osborne et al 1996; Pyke and White 1996, 2010; Gillespie 1997; Tyler 1997; Goldingay and Lewis 1999). The Approved NSW Threat Abatement Plan for Predation by <i>Gambusia holbrooki</i> (NPWS 2003) states that the most effective control method is physical control (draining and drying of dams and waterways). The threat abatement plan states that this technique is feasible if the water level can be easily manipulated and the reintroduction from upstream or downstream can be controlled. Where Mosquito Fish cannot be eradicated, supplementary Green and Golden Bell Frog habitat can be created adjacent to the area that prevents Mosquito Fish invasion. The Best practice guidelines for Green and	Medium agreement. The scientific community is in a high level of agreement that the presence of the Mosquito Fish in Green and Golden Bell Frog habitats in NSW has been an important factor in their decline, along with habitat destruction and modification (Mahony 1993; Daly 1995; Morgan 1995; Goldingay 1996; Mahony 1996; Morgan and Buttemer 1996; Osborne et al 1996; Pyke and White 1996, 2010; Gillespie 1997; Tyler 1997; Goldingay and Lewis 1999). The Approved NSW Threat Abatement Plan for Predation by <i>Gambusia holbrooki</i> (NPWS) states that the most effective control method is physical control (draining and drying of dams and waterways). This technique is feasible if the water level can be easily manipulated and the reintroduction from upstream or downstream can be controlled. The water level in ephemeral dams within the site could be manipulated such that they are dried out to eradicate Mosquito Fish.

Input parameter/value output	Values	
	Crescent Head (North) BA	Crescent Head (South) BA
	Golden Bell Frog habitat (DECC 2008) state that raised ponds can be created that would prevent fish and other frogs from entering. It is feasible to create alternative Green and Golden Bell Frog breeding ponds at the site that are not infested by Mosquito Fish.	
Degree of evidence (robust/medium/limited)	Robust evidence. Green and Golden Bell Frog are likely to forage at the site given the suitable habitat present, the numerous records surrounding the site and the high degree of connectivity of the vegetation and habitat at the site to the surrounding areas where the Green and Golden Bell Frog has been recorded (Figure 4.3). Green and Golden Bell Frogs are unlikely to breed due to the abundance of Mosquito Fish that prey on Green and Golden Bell Frog tadpoles. If Mosquito Fish can be eradicated, it is likely that Green and Golden Bell Frogs will breed at the site. Green and Golden Bell Frogs have successfully recolonised ponds where Mosquito Fish have been eliminated, e.g. Narawang Wetlands at Homebush (O'Meara and Darcovich 2008). Recolonisation has been demonstrated for a sympatric species, the Southern Bell Frog (<i>Litoria raniformis</i>) in Tasmania following the eradication of Mosquito Fish from breeding ponds.	Robust evidence. Green and Golden Bell Frogs are likely to forage and breed at the site given the suitable habitat present, the records surrounding the site and the high degree of connectivity of the vegetation and habitat at the site to the surrounding areas where the Green and Golden Bell Frog has been recorded, and Limeburners Creek National Park which contains a large area of suitable Green and Golden Bell Frog habitat (Figure 4.4). Although Mosquito Fish that prey on Green and Golden Bell Frog tadpoles are present at the site, Green and Golden Bell Frog breeding would still be possible due to the presence of refuge areas in ephemeral dams in which Mosquito Fish are likely to be periodically eliminated due to wetting and drying cycles. Control of Mosquito Fish would allow for successful Green and Golden Bell Frog breeding events. If Mosquito Fish can be eradicated, it is likely that Green and Golden Bell Frogs will breed at the site. Green and Golden Bell Frogs have successfully recolonised ponds where Mosquito Fish have been eliminated by draining and re-filling, e.g. Narawang Wetlands at Homebush (O'Meara and Darcovich 2008). Recolonisation has been demonstrated for a sympatric species, the Southern Bell Frog (<i>Litoria raniformis</i>) in Tasmania following the eradication of Mosquito Fish.
Confidence level (very high/high/medium/low/very low)	High	High



Crescent Head (north) and Crescent Head (south) provide a 99.29% direct offset for the action. Accordingly, other compensatory measures will be applied to offset the residual 0.71%. The value and scope of the indirect offset has been finalised with the Department.

The residual value has been addressed through a contribution to a study programme run by the NSW Biodiversity and Conservation Division of the Department of Planning, Industry and Environment. The programme was one of a number of options that was agreed by the Department in November 2019 as acceptable to meet the residual amount. During 2020, HVO partially funded a detailed mapping study to identify the extent of available habitat for the Green and Golden Bell Frog in the Crescent Head study area, including threats, barriers and breeding and refuge habitats.

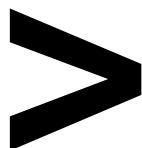
5.2.1.4 Swift Parrot

The variables used to perform swift parrot offset calculations in the Offsets Assessment Guide for Wandewoi and Hook is provided in Table 5.5. Combined, the sites will provide a 103.42% direct offset for the swift parrot and 42.25 adjusted hectares of net present value.

The application of the Offsets Assessment Guide for the Hook property was undertaken using the BBAM (OEH 2014) as guidance for the quality scores. EPBC Offset Guide spreadsheets and the use of BBAM metrics for inputs into the Guide is provided in Appendix D.

Table 5.5 - Credit calculation summary for Swift Parrot

Input parameter/value output	Values	
	Wandewoi BA	Hook BA
Impact Calculator		
Quantum of Impact (ha)	68.1	
Total quantum of impact (ha)	40.86	
Quality (scale 0-10)	6	
Offset Calculator		
Time over which loss is averted (years)	20 years	20 years
Time until ecological benefit (years)	5 years – Woodland The current state of the offset area consists of mature eucalypt woodland that includes potential winter foraging resources for the Swift Parrot. With active management including weed control, excluding grazing and fire management it has capacity to improve in condition and advance in maturity. Based on implementing management actions it is considered habitat quality can be increased by one point over 5 years. 20 years - DNG	20 years - The current state of the offset area consists of mature eucalypt woodland that includes preferred foraging resources for the Swift Parrot. Tree species include spotted gum (<i>Corymbia maculata</i>) and forest red gum (<i>Eucalyptus tereticornis</i>). With active management including targeted weed control for African olive, excluding grazing and fire management it has capacity to improve in condition and advance in maturity. Based on implementing management actions it is considered habitat quality can be increased by one point over 10 years.
Start area (ha)	175.8 ha Woodland 61 ha DNG	121.5 ha
Start Quality (scale 0-10)	5 – Woodland. A large area of potential winter foraging habitat for the swift parrot is present at the site. While key feed trees are not in high	6 - BBAM metrics entered into DoEE spreadsheet (refer to Appendix D): • Site Condition Score (out of 3) = 1.88 • Site Context Score (out of 3) = 1.80



Input parameter/value output	Values	
	Wandewoi BA	Hook BA
	abundance, the presence of CHVEFW CEEC may provide suitable habitat. 2 - DNG	Sp. Stocking Rate (out of 4) = 2.00 Total = 5.68 (rounded to 6).
Future quality without the offset (scale 0-10)	4 – Woodland. The current use of the Wandewoi BA is grazing and contains fragmented woodland areas within a primarily agricultural landscape. Livestock grazing can lead to soil compaction, simplification of structural diversity and restriction of shrub and sapling regrowth, leading to the reduction of suitable habitat quality. 2 – DNG	5 – BBAM metrics entered into DoEE spreadsheet (refer to Appendix D): - Site Condition Score (out of 3) = 1.50 - Site Context Score (out of 3) = 1.80 - Sp. Stocking Rate (out of 4) = 2.00 Total = 5.30 (rounded to 5).
Future quality with the offset (scale 0-10)	6 – Woodland. The implementation of offset management measures (Table 6.2) would improve the condition and increase the area Swift Parrot habitat at the site. 5 - DNG	7 - BBAM metrics entered into DoEE spreadsheet (refer to Appendix D): - Site Condition Score (out of 3) = 2.52 - Site Context Score (out of 3) = 2.04 - Sp. Stocking Rate (out of 4) = 2.00 Total = 6.56 (rounded to 7).
Risk of loss without the offset (%)	30% - Woodland. The site is currently zoned RU1 Primary Production and is situated on coal reserves that would require open cut mining to extract. Total loss of the CEEC is possible through clearing for agriculture or for coal extraction (however it is acknowledged that the latter would require suitable State and Commonwealth assessment process for this to occur). 5% - DNG	5% - While there are no specific development proposals stated for the Hook BA there are also no formal protection mechanisms for the property. There is potential for the total loss of the swift parrot habitat on the site due to residential development, agricultural, or viticultural expansion.
Risk of loss with the offset (%)	10% - Woodland. The risk of total loss of swift parrot habitat with an in-perpetuity conservation mechanism and management actions is considered unlikely, however it is acknowledged that mining development could still occur. 0% - DNG	0% - The risk of total loss of the CEEC with an in-perpetuity conservation mechanism and management actions is considered exceptionally unlikely.
Confidence in result (%)	80% - Woodland and DNG. High confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the habitat will be prevented.	100% - Very high confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the habitat will be prevented. 85% - High confidence for the proposed quality score changes following active weed control.

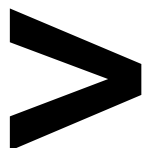
Input parameter/value output	Values	
	Wandewoi BA	Hook BA
Net present value (adjusted ha)	35.90 (31.84 ha Woodland and 4.06 ha DNG)	6.40
% of impact offset	87.68% (77.94% Woodland and 9.93% DNG)	15.68%
TOTAL	103.55% offset and 42.3 adjusted hectares (net present value)	
Confidence levels for future condition		
Degree of scientific agreement (high/medium/low)	High agreement. Habitat loss and fragmentation is recognised as a key threat to the species survival in the National Recovery Plan for the Swift Parrot. The protection of Swift Parrot winter foraging habitat at Wandewoi BA and Hook BA under a legally binding agreement will prevent future habitat loss and fragmentation for the species. The offset addresses a key threat to the species identified in its recovery plan, and therefore the degree of scientific agreement is high.	
Degree of evidence (robust/medium/limited)	Robust evidence. The site contains habitat critical to the survival of the species as it contains potential foraging habitat in an area where the species is likely to occur. The offset addresses a key recovery action for the species identified in its recovery plan, and therefore the degree of evidence is robust.	
Confidence level (very high/high/medium/low/very low)	Very High.	

5.2.2 Compliance with the Policy and Guide

The Commonwealth offset principles prescribed in the EPBC Act Environmental Offsets Policy (DSEWPac 2012a) have been considered in the formulation of this BOS, as demonstrated in Table 5.5.

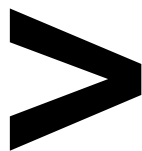
Table 5.5 - Compliance with offset principles

No.	Principle	Compliance
1.	Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	Mitchellhill, Wandewoi and Hook BA will protect and restore CHVEFW and Regent Honeyeater and Swift Parrot habitat, respectively in a fragmented agricultural landscape. Specifically, Mitchellhill BA will add to an existing, adjacent, intact biodiversity offset landholding that exists at Muscle Creek, and Hook will secure CHVEFW as habitat for the Swift Parrot in an area in proximity to the Belford National Park that will come under increasing developmental pressures. The BAs will increase the connections to vegetation to the south including at Lake Liddell, Plashett Reservoir, and Wandewoi BA. Mitchellhill BA would also protect these areas in perpetuity and reduce the current risks to CHVEFW, Swift Parrot and the Regent Honeyeater from key threatening processes. The protection of the eastern part of Condon View BA will avert the loss of an important stepping stone in a Regent Honeyeater dispersal corridor from breeding habitat west of Wollemi National



No.	Principle	Compliance
		Park to non-breeding habitat in Yengo National Park to the east. Weed control and the addition of key feed trees would increase the area of available habitat at the site. The protection of Green and Golden Bell Frog habitats at Crescent Head (north) and Crescent Head (south) will provide important benefits to the species through extension of the protected area network. The properties are located directly adjacent to Hat Head and Limeburners Creek National Parks in which the Green and Golden Bell Frog occur. Accordingly, the proposed offset sites will deliver an overall conservation outcome that improves the viability of protected matters impacted by the proposed action.
2.	Be built around direct offsets but may include other compensatory measures	The offset package is based on direct, land-based offsets that meet or exceed the 100% offset requirement under the EPBC Act Environmental Offset Policy for CHVEFW, Swift Parrot and Regent Honeyeater. A 99.29% direct offset will be provided for the Green and Golden Bell Frog, while the remaining 0.71% being provided as other compensatory measures has been agreed to with the Department. Accordingly, the BOS is built around direct offsets, and includes minimal other compensatory measures.
3.	Be in proportion to the level of statutory protection that applies to the protected matter	The EPBC Act Environmental Offset Policy and offset calculator have been used to determine if adequate offsets have been provided for MNES. The calculator accounts for the various levels of statutory protection for each MNES and therefore the BOS.
4.	Be of a size and scale proportionate to the residual impacts on the protected matter	The EPBC Act Environmental Offset Policy and offset calculator determine if the offset proposed is proportionate to the residual impacts to each MNES. The offset package exceeds the requirements of the policy for all MNES and is considered to be suitable to compensate for the residual significant impacts of the action.
5.	Effectively account for and manage the risks of the offset not succeeding	The EPBC Act Environmental Offset Policy accounts for uncertainty with the offsets within the calculations. This includes assessing the risk of the offset not succeeding. The proponent is committed to the preparation and implementation of an offset management plan, to ensure that the policy is met for all MNES impacted or potentially impacted. The biodiversity values discussed in this offset package will be managed for conservation in the long-term to compensate for the impacts of the proposed action. The offset management plan will detail the monitoring and an adaptive management framework to ensure that additional measures are implemented, should this be required.
6	Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action)	Mitchellhill BA, Wandewoi BA, Hook BA, Crescent Head BA (north) and Crescent Head BA (south) are owned by HVO. While Condon View BA is owned by Yancoal, a joint venture partner in HVO, the eastern portion of the site is not currently subject to any conservation agreement, or managed for conservation. Although the proposed offset sites are being managed for conservation by HVO pending acceptance by the Department, they are additional to any other requirements. Should it be required, when secured as an offset, the BAs may be used to offset impacts

No.	Principle	Compliance
		on those MNES which are also listed in NSW under the <i>Biodiversity Conservation Act 2016</i> (BC Act). In addition, the proposed biodiversity offsets are likely to contain habitat for a number of threatened species and communities listed under the NSW <i>Biodiversity Conservation Act 2016</i>. Ecosystem and species credits for NSW listed species will be calculated and retired at a later stage. Species credits will not be generated for the protected matters impacted by the proposed action.
7.	Be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offsets will be delivered following approval of the BOS. The adequacy of the offset package proposed has been assessed against Commonwealth requirements, discussed with the Department and is considered to adequately compensate for the impacts of the proposed action on MNES.
8.	Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced	The proposed offsets will be protected into the future through secure land tenure for ongoing conservation management through an appropriate legally binding mechanism.



6 Long Term Management

6.1 Overview

Long term management of the direct offset sites will be directed by an Offset Management Plan. The purpose of the Biodiversity Area management plan will be to describe the direct offsets and detail the actions that will be implemented to improve and protect CHVEFW and the habitat for Regent Honeyeater, Swift Parrot and Green and Golden Bell Frog.

6.2 Offset Security

The direct offsets have been secured by purchasing the properties and will be subject to a legally binding mechanism. Following discussions with the NSW government, the only security mechanisms that we could consider include:

- Biodiversity Stewardship Agreement (BSA) in accordance with Part 5 Division 2 of the NSW *Biodiversity Conservation Act 2016*; or
- Transfer to the State of NSW (e.g. State Forest, National Park or Crown Reserve).

The above mechanisms were reviewed to determine their suitability along with other mechanisms acceptable to the Commonwealth Minister for Environment for long-term protection of the direct offsets. HVO discussed these Commonwealth offsets with the NSW Biodiversity Conservation Trust, the NSW Office of Environment and Heritage and the NSW National Parks and Wildlife Service (NPWS) to determine a fit for purpose mechanism to protect the direct offsets.

It was determined that neither mechanism was suitable due to:

1. the offsets being the requirement of a Commonwealth approval not a State approval,
2. the NSW BSA mechanism requiring extensive ecological assessment and recalculation of all the offsets and impact areas (despite the impact areas having already been mined),
3. the contribution of the entire conservation bond into the Trust only for the annual management costs to be returned to HVO for activities identified for that year, and
4. the NSW National Parks and Wildlife Service being willing to accept only Condon View into the NSW national parks estate along with the applicable management costs, provided the agreement included the adjoining land for the Mount Thorley Warkworth Mine. It was discussed that:
 - no guarantee could be given that the lands will be managed, and funds expended, according to the management plan,
 - the risks associated with the Commonwealth approval and reporting requirements to be retained by HVO and not managed by the State, and
 - NPWS would ordinarily only take sites if there is a Total Fund Deposit (in-perpetuity funding for the management of the land for biodiversity gain) attached so they will usually require a BSA.

Alternatively, there are provisions within the EPBC Act under a s305 Conservation Agreement that could legally protect the direct offsets. This is the preferred conservation mechanism and, following extensive discussions with the Department, the appropriate studies have been completed to justify an application for the Minister's agreement.

It should be noted that other matters/ species not offset by this strategy may also be offset using the properties identified. For example, other species credits may be calculated and retired using the offset properties for other projects. While this opportunity is remote, the appropriate studies would be undertaken to fully understand the outcome of this decision and the option discussed with the relevant Department.

6.3 Schedule

The indicative BOS implementation schedule is provided in Table 6.1. Management of the proposed offsets have been in accordance with the Biodiversity Areas Management Plan since the draft was agreed to by the then DoEE

Table 6.1 - Indicative BOS implementation schedule

Elements	2016	2017	2018	2019	2020	2021 onwards
Commencement of Action						
Offset Identification						
- GIS analysis						
- Assessment						
Purchase Land						
BOS and BOMPs						
- Preparation						
- Submission						
- Department Approval						
Variation submission						
Additional assessment						
Hook Weed Management Plan Preparation						
BOS and BOMP edits						
Department approval						2025
Long Term Management						
Offsets Secured						2025
GGBF Offset Package						

6.4 Proposed Management Actions

Management measures been implemented to establish and manage the proposed offsets, and to monitor the efficacy of management measures in achieving future site condition values. An outline of the short, medium and long-term management measures proposed to achieve future condition commitments are provided in Table 6.2.

Management actions and performance management measures are detailed in the various Biodiversity Area management plans for the proposed offset properties that provide measurable targets against which the efficacy of management measures can be evaluated.

Table 6.2 – Proposed Management Measures

Offset Area	Species/Community	Final Condition Score	Final Condition Objective	Threats to Recovery Addressed through Management Actions	Management Action	Timeframe	Performance Evaluation
Mitchelhill BA	CHVEFW CEEC	9	To provide Class A high quality CEEC	Detrimental grazing, mowing and slashing regimes (TSSC 2015)	Grazing to be excluded except as a short term weed management strategy within restricted areas where terrain makes alternative strategies unavailable.	Short term	Monitor vegetation condition
				Invasive flora species (TSSC 2015)	Weed management to reduce competition with CHVEFW species and stimulate sapling recruitment.	Short to medium term	Monitor vegetation condition
				Vegetation clearing and landscape fragmentation (TSSC 2015)	Revegetate corridors through derived native grasslands with representative CHVEFW species to increase resilience of CHVEFW.	Medium term	Monitor revegetation success
	Regent honeyeater	9	To protect and improve suitable foraging and breeding habitat for regent honeyeater	Habitat degradation (DoE 2016)	Grazing to be excluded except as a short term weed management strategy within restricted areas where terrain makes alternative strategies unavailable.	Short term	Monitor vegetation condition
					Weed management to reduce competition and improve feed tree recruitment.	Short to medium term	Monitor vegetation condition

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Offset Area	Species/Community	Final Condition Score	Final Condition Objective	Threats to Recovery Addressed through Management Actions	Management Action	Timeframe	Performance Evaluation
				Habitat loss and fragmentation (DoE 2016)	Revegetate corridors through derived native grasslands with Regent Honeyeater nesting and foraging trees to increase the area of habitat.	Medium term	Monitor revegetation success
				Competition (DoE 2016)	Investigate the need for Noisy Miner management.	Medium to long term	The need for management is identified
Condon View BA	Regent honeyeater	9	To protect and maintain suitable foraging and breeding habitat for regent honeyeater	Habitat degradation (DoE 2016)	Weed management to reduce competition and improve feed tree recruitment.	Short to medium term	Monitor vegetation condition
				Habitat loss and fragmentation (DoE 2016)	Revegetate degraded areas with Regent Honeyeater nesting and foraging trees to increase the area of habitat.	Medium term	Monitor revegetation success
				Competition (DoE 2016)	Investigate the need for Noisy Miner management.	Medium to long term	The need for management is identified
Crescent Head (North)	Green and golden bell frog	7	To provide suitable foraging and breeding habitat for green and golden bell frog	Predation by introduced fish (DECC 2007)	Investigate management actions for the Mosquito Fish to improve breeding habitat	Short to medium term	Monitor Mosquito Fish in breeding habitat
					Creation of alternative breeding habitats	Short to medium term	Monitor Mosquito Fish in breeding habitat

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Offset Area	Species/Community	Final Condition Score	Final Condition Objective	Threats to Recovery Addressed through Management Actions	Management Action	Timeframe	Performance Evaluation
				Habitat loss, habitat modification and disturbance (DECC 2007)	Maintain existing open areas (i.e. foraging habitats)	Short to long term	Monitor vegetation structure in open areas
					Targeted breeding, foraging, refuge and connectivity habitat enhancement guided by Best Practice Guidelines for Green and Golden Bell Frog habitat	Short to long term	Offline pond design with consideration to breeding habitat principles outlined in <i>Best Practice Guidelines for Green and Golden Bell Frog Habitat</i>
Crescent Head (South)	Green and golden bell frog	8	To provide suitable foraging and breeding habitat for green and golden bell frog	Predation by introduced fish (DECC 2007)	Investigate management actions for the Mosquito Fish to improve breeding habitat	Short to medium term	Monitor Mosquito Fish in breeding habitat
					Creation of alternative breeding habitats	Short to medium term	Monitor Mosquito Fish in breeding habitat
				Habitat loss, habitat modification and disturbance (DECC 2007)	Maintain existing open areas (i.e. foraging habitats)	Short to long term	Monitor vegetation structure in open areas

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Offset Area	Species/Community	Final Condition Score	Final Condition Objective	Threats to Recovery Addressed through Management Actions	Management Action	Timeframe	Performance Evaluation
					Targeted breeding, foraging, refuge and connectivity habitat enhancement guided by Best Practice Guidelines for Green and Golden Bell Frog habitat	Short to long term	Offline pond design with consideration to breeding habitat principles outlined in <i>Best Practice Guidelines for Green and Golden Bell Frog Habitat</i>
Wandewoi	CHVEFW CEEC	8 – Woodland and DNG	To provide Class A high quality CEEC	Detrimental grazing, mowing and slashing regimes (TSSC 2015)	Grazing to be excluded except as a short term weed management strategy within restricted areas where terrain makes alternative strategies unavailable.	Short term	Monitor vegetation condition
				Invasive flora species (TSSC 2015)	Weed management to reduce competition with CHVEFW species and stimulate sapling recruitment.	Short to medium term	Monitor vegetation condition
				Vegetation clearing and landscape fragmentation (TSSC 2015)	Revegetate in derived native grasslands with representative CHVEFW species to increase resilience of CHVEFW.	Medium term	Monitor revegetation success

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Offset Area	Species/Community	Final Condition Score	Final Condition Objective	Threats to Recovery Addressed through Management Actions	Management Action	Timeframe	Performance Evaluation
	Swift parrot	6 – Woodland 5 - DNG	To protect and maintain suitable foraging habitat for swift parrot	Habitat degradation (DoE 2016)	Strategic grazing management to prevent soil erosion and compaction and improve feed tree recruitment.	Short term	Monitor vegetation condition
					Weed management to reduce competition and improve feed tree recruitment.	Short to medium term	Monitor vegetation condition
				Habitat loss and fragmentation (DoE 2016)	Revegetate in derived native grasslands with swift parrot foraging trees to increase the area of habitat.	Medium term	Monitor revegetation success
				Competition (DoE 2016)	Investigate the need for Noisy Miner management.	Medium to long term	The need for management is identified
Hook	CHVEFW CEEC	7 – Woodland and Regeneration 5 - DNG	To provide Class A high quality CEEC	Detrimental grazing, mowing and slashing regimes (TSSC 2015)	Grazing to be excluded except as a short term weed management strategy within restricted areas where terrain makes alternative strategies unavailable.	Short term	Monitor vegetation condition
				Invasive flora species (TSSC 2015)	Weed management to reduce competition with CHVEFW species and stimulate sapling recruitment.	Short to medium term	Monitor vegetation condition
				Vegetation clearing and landscape fragmentation (TSSC 2015)	Revegetate in derived native grasslands with representative CHVEFW species to increase resilience of CHVEFW.	Medium term	Monitor revegetation success

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Offset Area	Species/Community	Final Condition Score	Final Condition Objective	Threats to Recovery Addressed through Management Actions	Management Action	Timeframe	Performance Evaluation
	Swift parrot	7	To protect and maintain suitable foraging habitat for swift parrot	Habitat degradation (DoE 2016)	Grazing to be excluded except as a short term weed management strategy within restricted areas where terrain makes alternative strategies unavailable.	Short term	Monitor vegetation condition
					Weed management to reduce competition and improve feed tree recruitment.	Short to medium term	Monitor vegetation condition
				Habitat loss and fragmentation (DoE 2016)	Revegetate in derived native grasslands with swift parrot foraging trees to increase the area of habitat.	Medium term	Monitor revegetation success
				Competition (DoE 2016)	Investigate the need for Noisy Miner management.	Medium to long term	The need for management is identified

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6.5 Management Action Implementation

The implementation of management objectives and completion criteria for the proposed offsets are provided in Table 6.3. Further detail on key performance indicators is provided in the various Biodiversity Area management plans.

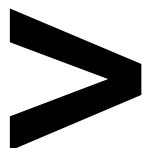
Table 6.3 – Implementation Schedule (Conditions 4 to 7)

Objective	Offset Area	Start Condition	Future Condition	Completion Criteria
1. To compensate for residual significant impacts to 54.4 ha of Class A condition CHVEFW from the Riverview Pit extension area	Mitchelhill BA	8	9	Observed and measured increase in condition through monitoring over 10 years in woodland.
	Wandewoi BA	7	8	
	Hook BA	6	7	
2. To compensate for residual significant impacts to 6.6 ha of Class B condition CHVEFW from the West Pit extension area	Wandewoi BA	5	8	Observed and measured trajectory towards and / or attainment of the key characteristics of CHVEFW or reference site attributes in DNG over 10 years
	Hook BA	5	7	
		3	5	
3. To compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater	Mitchelhill BA	8	9	Observed and measured increase in or maintained condition through monitoring over 10 years in woodland. Observed and measured trajectory towards and / or attainment of the key characteristics of CHVEFW or reference site attributes in DNG over 10 years
	Condon View BA	9	9	
4. To compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog	Crescent Head (North) BA	5	7	Observed and measured increase in or maintained condition through monitoring over 10 years. Mosquito Fish control trials are completed and their success is evaluated by analysis of monitoring results. Offline ponds are designed with consideration of breeding habitat principles outlined in Best Practice Guidelines for Green and Golden Bell Frog Habitat. Foraging habitat is managed with consideration of the principles outlined in Best Practice Guidelines for Green and Golden Bell Frog Habitat. Open vegetation structure is maintained on existing tracks and fence lines.
	Crescent Head (South) BA	6	8	

5. To compensate for residual significant impacts to 68.1 ha of winter foraging habitat for the Swift Parrot	Wandewoi BA	5	6	The offset contains suitable winter foraging resources for the Swift Parrot.
		2	5	The offset contains derived native grassland that can be restored to provide winter foraging resources for the Swift Parrot.
	Hook BA	6	7	The offset contains suitable winter foraging resources, including key feed tree species for the Swift Parrot.

6.6 Performance Evaluation

Table 6.2 provides an outline of the proposed performance evaluation measures. Further detail on the key performance indicators, completion criteria and the monitoring program is provided in the Biodiversity Areas Management Plan (HVO, 2021). Monitoring of vegetation condition is completed in accordance with the Biodiversity Assessment Method (OEH 2017). Any threatened species or fauna assemblage monitoring is completed in accordance with relevant state and Commonwealth survey guidelines.



7 Risk Assessment and Corrective Actions

7.1 Risk Framework

The risk of failure to achieve the offset objectives has been determined using the risk framework provided in the offset strategy checklist and shown in Table 7.1.

Table 7.1 – Risk Framework

		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

The risk level is determined by combining the likelihood and the consequence of the objective not being achieved. Table 7.2 provides the criteria to determine the level of likelihood and Table 7.3 provides the criteria for determining the level of consequence.

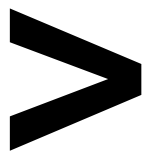
Table 7.2 – Criteria to determine likelihood

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly Likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 7.3 – Criteria to determine consequence

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
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

A risk assessment is provided in Section 7.2 using the criteria provided in Table 7.1 to 7.3.

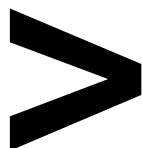


7.2 Risk Assessment and Corrective Actions

Table 7.4 provides an assessment of the risk of failure to achieve the offset objectives, using the criteria in Table 7.1 to 7.3. The assessment also identifies the circumstances that will trigger the implementation of corrective actions, and describes these corrective actions.

Table 7.4 - Risk assessment and management

Objective	Event	Likelihood	Consequence	Risk Level	Trigger	Corrective Action
1. To compensate for residual significant impacts to 54.4 ha of Class A condition CHVEFW from the Riverview Pit extension area	Delays in negotiation with State and Commonwealth regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with the Department
	Proposed management measures are unsuccessful	Possible	Minor	Low	Acceptable targets are not achieved	To be detailed in the Mitchelhill, Wandewoi and Hook BA OMPs
2. To compensate for residual significant impacts to 6.6 ha of Class B condition CHVEFW from the West Pit extension area	Delays in negotiation with State and Commonwealth regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with the Department
	Proposed management measures are unsuccessful	Possible	Minor	Low	Acceptable targets are not achieved	To be detailed in the Mitchelhill, Wandewoi and Hook BA OMPs
3. To compensate for residual significant impacts to 68.4 ha of breeding and foraging habitat for the Regent Honeyeater	Delays in negotiation with State and Commonwealth regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with the Department
	Proposed management measures are unsuccessful	Possible	Minor	Low	Acceptable targets are not achieved	To be detailed in the Mitchelhill BA and Condon OMPs
4. To compensate for residual significant impacts to 2.6 ha of breeding habitat and 102.7 ha of foraging habitat for the Green and Golden Bell Frog	Delays in negotiation with State and Commonwealth regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with the Department



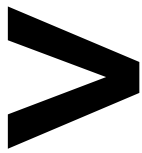
Objective	Event	Likelihood	Consequence	Risk Level	Trigger	Corrective Action
	Proposed Mosquito Fish management unsuccessful	Likely	Moderate	Medium	Mosquito Fish management is not achieved	To be detailed in the Crescent Head (North) and Crescent Head (South) BA OMPs
5. To compensate for residual significant impacts to 68.1 ha of winter foraging habitat for the Swift Parrot	Delays in negotiation with State and Commonwealth regarding a suitable offset mechanism	Possible	Medium	Medium	Delay in securing offset site under legally binding agreement	Additional consultation with the Department
	Proposed management measures are unsuccessful	Possible	Minor	Low	Acceptable targets are not achieved	To be detailed in the Mitchelhill, Wandewoi and Hook BA OMPs

8 Reporting

Reporting requirements relating to the BOS are provided in Table 8.1.

Table 8.1 – Reporting Requirements

No.	Type of Report	Approval Condition	Timing	Reporting Authority
1.	Compliance with approval	22	A date agreed to in writing by the Minister for every 12 month anniversary of the commencement of the action	the Department
2.	Independent compliance audit	21B, 21C	Upon discretion of the Minister	the Department
3.	Biodiversity offset management plan	11	For approval	the Department



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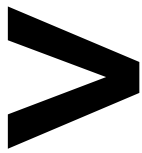
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Appendix A - Offset Calculations for CHVEFW

Offsets Assessment Guide	
For use in determining offsets under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> 2 October 2012	
This guide relies on Macros being enabled in your browser.	

Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	3.96	Adjusted hectares	Hook (DNG)	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	2.6	Risk of loss (%) without offset	5%	Risk of loss (%) with offset	0%	0.13	100%	0.13	0.03	0.10	2.65%	No		
								Future area without offset (adjusted hectares)	2.5	Future area with offset (adjusted hectares)	2.6											
						Time until ecological benefit	30	Start quality (scale of 0-10)	3	Future quality without offset (scale of 0-10)	2	Future quality with offset (scale of 0-10)	5									
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	0.10	2.65%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

Offsets Assessment Guide

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

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	3.96	Adjusted hectares	Hook (Regen)	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	28.3	Risk of loss (%) without offset	5%	Risk of loss (%) with offset	0%	1.42	100%	1.42	0.38	2.10	53.15%	No		
						Future area without offset (adjusted hectares)	26.9	Future area with offset (adjusted hectares)	28.3													
						Time until ecological benefit	20	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	4	Future quality with offset (scale of 0-10)	7									
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	2.10	53.15%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF Riverview	Area	31.7	Hectares	PD
				Quality	8	Scale 0-10	
				Total quantum of impact	25.36	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																								
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	Yes	25.36	Adjusted hectares	Hook (Woodland)	Risk-related time horizon (max. 20 years)		20	Start area (hectares)	78.1	Risk of loss (%) without offset		5%	Risk of loss (%) with offset		0%	3.91	100%	3.91	1.05	7.27	28.65%	No	
						Future area without offset (adjusted hectares)		74.2	Future area with offset (adjusted hectares)		78.1													
						Time until ecological benefit		10	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)		5	Future quality with offset (scale of 0-10)		7								
	Threatened species habitat																							
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	25.36	7.27	28.65%	No	\$0.00	#DIV/0!	#DIV/0!
						\$0.00	#DIV/0!	#DIV/0!

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	3.96	Adjusted hectares	MitchellHill	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	3.4	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	90%	0.00	0.00	0.48	12.01%	No		
										Future area without offset (adjusted hectares)	3.4	Future area with offset (adjusted hectares)	3.4									
						Time until ecological benefit	10	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	9	3.00	90%	2.70	1.40					
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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					
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	0.48	12.01%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF Riverview	Area	22.7	Hectares	PD
				Quality	8	Scale 0-10	
				Total quantum of impact	18.16	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	18.16	Adjusted hectares	MitchellHill	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	129.86	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	90%	0.00	0.00	18.16	100.00%	Yes		
							Future area without offset (adjusted hectares)	129.9	Future area with offset (adjusted hectares)	129.9												
						Time until ecological benefit	10	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	9									
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	18.16	18.16	100.00%	Yes	\$0.00	N/A	\$0.00
							\$0.00	\$0.00

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	3.96	Adjusted hectares	Wandewoi (DNG)	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	61	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	10%	12.20	80%	9.76	2.62	3.16	79.86%	No		
						Future area without offset (adjusted hectares)	42.7	Future area with offset (adjusted hectares)	54.9													
						Time until ecological benefit	30	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	8									
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	3.16	79.86%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF Riverview	Area	31.7	Hectares	PD
				Quality	8	Scale 0-10	
				Total quantum of impact	25.36	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																								
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	Yes	25.36	Adjusted hectares	Wandewoi (Woodland)	Risk-related time horizon (max. 20 years)		20	Start area (hectares)	175.8	Risk of loss (%) without offset		30%	Risk of loss (%) with offset		10%	35.16	80%	28.13	7.55	16.23	64.02%	No	
						Future area without offset (adjusted hectares)		123.1	Future area with offset (adjusted hectares)		158.2													
						Time until ecological benefit		10	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)		6	Future quality with offset (scale of 0-10)		8								
	Threatened species habitat																							
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	25.36	16.23	64.02%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

Appendix B - Offset Calculations for Regent Honeyeater

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	RE & SP
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
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	Regent Honeyeater	Area	68.4	Hectares	
				Quality	5	Scale 0-10	
				Total quantum of impact	34.20	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																						
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			Secured offsets	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	34.20	Adjusted hectares	Secured offsets	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	132	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	90%	0.00	0.00	18.46	53.98%	No		
						Future area without offset (adjusted hectares)	132.0		Future area with offset (adjusted hectares)	132.0												
						Time until ecological benefit	10	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	9									
	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								
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	34.2	18.46	53.98%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#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	RE & SP
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
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	Regent Honeyeater	Area	68.4	Hectares	
				Quality	5	Scale 0-10	
				Total quantum of impact	34.20	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																						
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			Secured offsets	Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset	0.0	Risk of loss (%) with offset	0.0									
										Future area without offset (adjusted hectares)		Future area with offset (adjusted hectares)										
						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	34.20	Adjusted hectares	Secured offsets	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	168	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	95%	0.00	0.00	15.96	46.67%	No		
										Future area without offset (adjusted hectares)	168.0	Future area with offset (adjusted hectares)	168.0									
						Time until ecological benefit	0	Start quality (scale of 0-10)	9	Future quality without offset (scale of 0-10)	8	Future quality with offset (scale of 0-10)	9	1.00	95%	0.95	0.95					
	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							
Summary	Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)	
						Direct offset (\$)	Other compensatory measures (\$)
	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	34.2	15.96	46.67%	No	\$0.00	#DIV/0!
	Area of community	0				\$0.00	\$0.00
						\$0.00	#DIV/0!

Appendix C - Offset Calculations for Green and Golden Bell Frog

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	Green and Golden Bell Frog
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							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	No		Area			
				Quality	0		
				Total quantum of impact	0.00		
	Threatened species habitat						
	Area of habitat	Yes	Green and Golden Bell Frog	Area	105.3	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	63.18	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						

[illegible]

Summary								
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	63.18	14.87	23.54%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0	0.00	#DIV/0!	#DIV/0!	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Green and Golden Bell Frog
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							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	No		Area			
				Quality	0		
				Total quantum of impact	0.00		
	Threatened species habitat						
	Area of habitat	Yes	Green and Golden Bell Frog	Area	105.3	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	63.18	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																					
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	Yes		Adjusted hectares	Secured offsets	Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset		0.00		0.00	0.00	0.00	#DIV/0!	#DIV/0!	
						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)		0.00		0.00	0.00									
	Threatened species habitat																				
	Area of habitat	Yes	63.18	Adjusted hectares	Crescent Head South	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	136.71	Risk of loss (%) without offset	20%	Risk of loss (%) with offset	0%	27.34	90%	24.61	23.64	47.86	75.75%	No	
						Future area without offset (adjusted hectares)	109.4	Future area with offset (adjusted hectares)	136.7												
	Time until ecological benefit	10	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	90%	2.70	2.65									
	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								
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	63.18	47.86	75.75%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0	0.00	#DIV/0!	#DIV/0!	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

Appendix D - Offset Calculations for Swift Parrot

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	Swift Parrot
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
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	Swift Parrot Impacts	Area	68.1	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	40.86	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																					
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	40.86	Adjusted hectares	Hook (Woodland)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	121.5	Risk of loss (%) without offset	5%	Risk of loss (%) with offset	0%	6.08	100%	6.08	1.63		15.68%	No	
										Future area without offset (adjusted hectares)	115.4	Future area with offset (adjusted hectares)	121.5								
						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)	7	2.00	85%	1.70	0.46				
	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								
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	40.86	6.40	15.68%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#DIV/0!

Offsets Assessment Guide	
For use in determining offsets under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> 2 October 2012	
This guide relies on Macros being enabled in your browser.	

Matter of National Environmental Significance	
Name	Swift Parrot
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
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	Swift Parrot Impacts	Area	68.1	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	40.86	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																					
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									
									0.0		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	40.86	Adjusted hectares	Wandewoi (DNG)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	61	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	10%	12.20	80%	9.76	2.62	4.06	9.93%	No	
									42.7		54.9										
						Time until ecological benefit	20	Start quality (scale of 0-10)	2	Future quality without offset (scale of 0-10)	2	Future quality with offset (scale of 0-10)	5								
	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								
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	40.86	4.06	9.93%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#DIV/0!

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

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

Impact calculator							
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	Swift Parrot Impacts	Area	68.1	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	40.86	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																						
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	0.0	Risk of loss (%) with offset	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	40.86	Adjusted hectares	Wandewoi (Woodland)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	175.8	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	10%	35.16	80%	28.13	22.16		77.94%	No		
						Time until ecological benefit	5	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	4	Future quality with offset (scale of 0-10)	6	2.00	80%	1.60	1.51					
	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								
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	40.86	31.84	77.94%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#DIV/0!

Appendix E - Correspondence regarding BBAM Metric Use in EPBC Offsets Guide Calculations

Briefing Note

To: Commonwealth Department of Climate Change, Energy, The Environment and Water
From: Michael Lloyd (Hunter Valley Operations),
Author: Allison Riley (Umwelt)
Date: 25 November 2024
Subject: Summary of HVO Revised Commonwealth Biodiversity Offset Strategy

Purpose

Due to the drought conditions that were experienced in NSW during 2017-2020, the requirement to regenerate 230 hectares of grassland at the Wandewoi Offset Site presented a compliance risk for Hunter Valley Operations (HVO). HVO therefore proposed to substitute the majority of the grassland areas of their approved Wandewoi offset for the HVO site (EPBC 2016/7640) with the Hook property in Belford, and Mitchelhill property near Muswellbrook for impacts to the *Central Hunter Valley Eucalypt Forest and Woodland* critically endangered ecological community (CHVEFW CEEC).

It was determined by the (then) Commonwealth Department of Agriculture, Water and Environment (DAWE) that in order to facilitate an adequate offset swap for the CHVEFW CEEC, HVO must demonstrate that the revised offset package meets the approved quantum of impact (i.e., adjusted hectares) as calculated by the EPBC Offset Assessment Guide tool. The approved quantum of impact for the CHVEFW CEEC is **29.32**.

Key Outcomes

The total quantum of offset provided by the revised offset strategy for the CHVEFW CEEC is **29.34** and includes:

Offset Site	CHVEFW CEEC Condition	Area (ha)	Net Value (Offset Quantum)
Wandewoi	Woodland	175.8	16.23
	Derived Native Grassland	61.0	3.16
Hook	Woodland	78.1	7.27
	Regeneration	28.3	2.10
	Derived Native Grassland	2.6	0.10
Mitchelhill	Woodland	3.4	0.48
TOTAL		349.2	29.34

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Attachments

- 1. BBAM Metrics Spreadsheet**
- 2. EPBC Act Offset Assessment**
- 3. Hook Property Figures**

1.0 Introduction

Umwelt was engaged by Hunter Valley Operations (HVO) to assist in undertaking an assessment of the Hook property for the proposed offset swap in relation to the EPBC Act Environmental Offsets Policy (the Policy) requirements for the Riverview and West Pits at the Hunter Valley Operations site (2016/7640).

Due to the ongoing drought conditions in NSW in the period 2017-2020, the requirement to regenerate 230 hectares (ha) of grassland at the Wandewoi Offset Site presented a compliance risk for Hunter Valley Operations (HVO). Furthermore, there were community concerns in relation to the loss of the agricultural landscape of Jerrys Plains. HVO therefore proposed to substitute the majority of the grassland areas of their approved Wandewoi offset for the HVO site (EPBC 2016/7640) with the Hook property in Belford for impacts to the *Central Hunter Valley Eucalypt Forest and Woodland* critically endangered ecological community (CHVEFW CEEC).

Umwelt has undertaken an assessment of the proposed Hook offset property using the Commonwealth-accredited BioBanking Assessment Methodology (BBAM) and completed the EPBC Offset Assessment Guide tool to demonstrate that the offset swap provides the same or greater offset quantum outcome. Additionally, a small area of CHVEFW CEEC at the Mitchelhill property, unallocated to an offset package, is proposed to be included in this variation. This briefing note includes a summary of the methods employed, justification for the inputs to the EPBC Offset Assessment Guide and the outcome of the assessment.

1.1 Proposed Revised Offset Strategy

The proposed revised offset strategy includes:

Wandewoi Offset Site:

- 175.8 ha of woodland conforming to CHVEFW CEEC (unchanged from original offset strategy)
- 61.0 ha of derived native grassland to be restored to CHVEFW CEEC (reduced from 230 ha)

Hook Offset Site:

- 78.1 ha of woodland conforming to CHVEFW CEEC
- 28.3 ha of regeneration conforming to CHVEFW CEEC
- 2.6 ha of derived native grassland to be restored to CHVEFW CEEC.

Mitchelhill Offset Site:

- 3.4 ha of woodland conforming to CHVEFW CEEC.

2.0 Quantum of Impacts and Offset Requirement

It has been determined by the Department of Agriculture, Water and Environment (DAWE) that in order to facilitate an adequate offset swap for the CHVEFW CEEC, HVO must demonstrate that the revised offset package meets the approved quantum of impact (i.e., adjusted hectares) as calculated by the EPBC Offset Assessment Guide tool.

The approved quantum of impact for the CHVEFW CEEC is **29.32**. This consists of:

- Riverview Pit impacts of 31.7 hectares x 8/10 quality score = 25.36
- West Pit impacts of 6.6 hectares x 6/10 quality score = 3.96

The quantum area of offset is the number determined by the EPBC Offset Assessment Guide tool titled “Net Present Value – Adjusted Hectares”. It takes into account other inputs into the tool including risk of loss, time until ecological benefit, future quality scores, etc. The revised offset strategy’s total quantum of offset therefore must meet 29.32.

It is understood that the offset requirement for the CHVEFW CEEC corresponds to the offsetting requirements for the swift parrot as this CEEC provides potential winter foraging habitat for the species. A brief discussion of this is provided in **Section 4.3**.

3.0 Methods

3.1 BBAM Assessment of Hook Property

Umwelt has undertaken an assessment of the Hook property using the BBAM to help inform the habitat quality scores in the EPBC Act Offset Policy calculator. This involved the following tasks:

- Additional BBAM plot and transect surveys (previous plot and transect surveys by EMM were also used) and
- Data collation, GIS and application of the BioBanking Credit Calculator.

Additional surveys were undertaken at the Hook property by two Umwelt ecologists on 13 and 14 June 2019. These surveys were required to ensure that the minimum survey requirements under BBAM (2014) were met. **Table 1** below outlines the overall survey adequacy.

Table 1 – Plot and Transect Survey Adequacy (BBAM 2014)

Vegetation Zone	Area (ha)	Plot Requirement (BBAM 2014)	Plots Completed	
			EMM	Umwelt
HU815 - Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter <i>Woodland</i>	78.1	5	5	0
HU815 - Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter <i>Regeneration</i>	28.3	4	2	2
HU815 - Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter <i>Derived Native Grassland</i>	2.6	2	1	2

3.2 BBAM Metrics in EPBC Offset Assessment Guide Tool

The BioBanking Credit Calculator provides a Site Value Score (condition of the vegetation measured against benchmark) which, as suggested by DAWE, can inform the quality score in the EPBC Offset Assessment Guide tool. The BioBanking Credit Calculator also provides the future Site Value Scores with the offset (including management actions) and without the offset (averted loss). The Landscape Value metrics from the BioBanking Credit Calculator includes connectivity, patch sizes and native vegetation cover that was used to provide guidance for the Site Context Score. As per advice from DAWE, the Species Stocking Rate score is not applicable to the CEEC.

Table 2 below provides a summary of the metrics used to guide the quality scores and the proposed weighting of the quality score components for the *Central Hunter Valley Eucalypt Forest and Woodland CEEC*.

Table 2 – Proposed Metric Guidance

Quality Score Component	Proposed Metric Guide	Weighting
Site Condition	Site Value Score (BBAM)	7/10
Site Context	Landscape Value Score (BBAM)	3/10
Species Stocking Rate	N/A	N/A

An excel spreadsheet was prepared to illustrate the use of the BioBanking Credit Calculator outcomes to inform the quality scores in the EPBC Offset Assessment Guide tool (refer to **Attachment 1**) following consultation with DAWE (formerly DoEE).

4.0 EPBC Offset Assessments

4.1 Wandewoi Property

The EPBC Offset Assessment Guide tool assessments for the Wandewoi property remain majority unchanged from the original assessment approved by DAWE. The only edits that have been applied to the revised offset strategy is the reduction in grassland area to 61.0 hectares. All other inputs are as per the original approved offset strategy assessment.

In summary, the quantum of offset provided by the Wandewoi Offset Site is **19.39** and includes:

- 175.8 ha of woodland CHVEFW CEEC = 16.23
- 61.0 ha of derived native grassland to be actively restored to CHVEFW CEEC = 3.16

This assessment is provided in tabs 1 and 2 of **Attachment 2**.

4.2 Hook Property

Table 3 below outlines the inputs and their justifications entered into the EPBC Offset Assessment Guide tool for the Hook property. These assessments used the quality score guidance provided by the BBAM assessment as described above.

In summary, the quantum of offset provided by the Hook Offset Site is **9.47** and includes:

- 78.1 hectares of woodland CHVEFW CEEC = 7.27
- 28.3 hectares of regeneration CHVEFW CEEC = 2.10
- 2.6 hectares of derived native grassland to be actively restored to CHVEFW CEEC = 0.10

This assessment is provided in tabs 3, 4 and 5 of **Attachment 2**.

4.3 Mitchelhill Property

The majority of the CHVEFW CEEC within the Mitchelhill property has been allocated to impacts associated with Condition 5 of EPBC 2016/7640. However, 3.4 ha of CHVEFW CEEC at the property remains unallocated to an offset package. HVO proposes to include this 3.4 ha in the offset variation proposed for Condition 4 of EPBC 2016/7640. The EPBC Offset Assessment Guide tool assessments for the Mitchelhill property remains unchanged from the original assessment approved by DAWE for Condition 5.

In summary, the quantum of offset provided by the Mitchelhill Offset Site is **0.48** and includes:

- 3.4 ha of woodland CHVEFW CEEC = 0.48

This assessment is provided in tab 6 of **Attachment 2**.

Table 3 – Hook Property EPBC Offset Assessment Inputs and Justification

Input	Score	Justification
Woodland		
Offset Area	78.1 ha	N/A
Offset Site Start Quality	6	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): • Site Condition Score (out of 7) = 4.39 • Site Context Score (out of 3) = 1.26 Total = <u>5.65</u> (rounded to 6) The woodland is in moderate condition and conforms to the CEEC as outlined in the Conservation Advice, however the community has been cleared or thinned historically. The majority of trees have a diameter at breast height of 20-30cm. The site is well connected to other patches of native woodland in the southeast and southwest. The woodland is subject to disturbances from weeds, including the highly invasive African olive and the contra-indicative species <i>Eucalyptus fibrosa</i> occurs in the locality. While this represents a good quality patch of CEEC, improvements are possible.
Without Offset Quality	5	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): • Site Condition Score (out of 7) = 3.51 • Site Context Score (out of 3) = 1.26 Total = <u>4.77</u> (rounded to 5) Without the offset, the risk of CEEC degradation due to the presence and expansion of African olive is high. African olive is considered to be one of the most serious invasive species in the Hunter region because of its ability to completely alter ecosystem structure (Peake 2006). In fact, in this region, African olive is known to fundamentally alter vegetation communities (Cuneo & Leishman 2006) and prevent the regeneration of native species through the formation of a dense mid-canopy that blocks any infiltration of sunlight (NSW Scientific Committee 2011; Peake 2006). As native seedlings require sunlight for growth and establishment this species thereby prevents regeneration of overstorey species including eucalypts (Peake 2006). Vegetation communities can therefore quickly become altered beyond recognition by this weed, as canopy species senesce and are not replaced. This dense canopy also results in the long-term loss of native species from the soil seedbank, limiting the ability of native plant communities to naturally regenerate in shrub and ground strata. Further, Peake (2006) listed African olive as one of the top emerging weed species, and now observations by land managers in the Hunter region confirm that African olive is well established in the area, with an estimated 15,000 ha being infested in the Maitland local government area alone in 2006 (Cuneo & Leishman 2006). This highlights the ability of the species to spread very rapidly and create a dense monoculture, and therefore the requirement for effective and ongoing control.

Input	Score	Justification
		Invasion of native plant communities by African olive is a key threatening process under the NSW BC Act and there is evidence that communities can be substantially changed, and the ability of native communities to regenerate is greatly limited, within 15 years of invasion (NSW Scientific Committee 2011). Additionally, the KTP 'Novel biota and their impact on biodiversity' is listed under the EPBC Act and the listing advice states that African Olive is a well- established, long lived weed that produces extensive crop annually, and poses a major threat in the Hunter Valley (TSSC 2013). In this region, seven vulnerable or endangered Spotted Gum/Box/Ironbark communities listed under the BC Act are considered to be under serious threat from this species, some of which are communities likely to conform to the CEEC on site (NSW Scientific Committee 2011). Without management, this species is therefore likely to reduce the quality of the woodland by one point over a 10-year period as African olive is not classified as a noxious weed and landowners are not obligated to remove stands from their property.
With Offset Quality	7	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): • Site Condition Score (out of 7) = 5.87 • Site Context Score (out of 3) = 1.39 Total = <u>7.26</u> (rounded to 7) Following the application of active management actions to specifically manage African olive as well as fencing to reduce unwanted access and disturbance, the woodland is likely to improve its quality by one point over a 10-year period.
Risk of Loss Without Offset	5%	The Hook property is located in Belford, west of the township of Branxton in the Hunter Region and is zoned RU1 Primary Production under the Singleton LEP 2013. This locality is characterised by agricultural, rural residential and viticultural land uses. A range of existing and future development occurs in the locality that poses risk to the biodiversity features of the property and could result in the total loss of the <i>Central Hunter Valley Eucalypt Forest and Woodland CEEC</i>. This includes residential and tourism development, agricultural, and viticultural expansion. The Branxton subregional population is expected to double in the next 20 years (Branxton Subregion Land Use Strategy and Structure Plan 2016). While the expanding town of Huntlee will account for most of this growth, the increased accessibility provided by the Hunter Expressway is expected to lead to an increase in residential development, including rural residential development, and migration to the area. The township of Huntlee is currently located approximately 3.5km to the east of the property, with future plans to extend the development west to within 1.3km of the Hook property, adjacent to Black Creek (Huntlee Master Plan). Other residential development has also commenced in Radford Park, 6km to the north east. The Hermitage Road Pokolbin Planning Study (PAA 2014) identifies a range of planning proposals within 2km of the Hook property that indicate the encroachment of development on vacant land in the area, including re-zoning for tourism, horticulture, viticulture, rural residential, retail and tourism purposes. Two off-ramps are located immediately to the north-east and north-

Input	Score	Justification
		west of the western extension (Belford) section of the Hunter Expressway, which facilitates the opportunity for increased development in this area. The Upper Hunter Strategic Regional Land Use Plan (Map 6) maps the land within the Hook property and it's surrounds as being part of a critical industry cluster (CIC) for viticultural activities under the DPI Strategic Agricultural Land (SAL) mapping. Furthermore, the Hunter Regional Plan 2036 identifies urban development opportunities in Huntlee and Branxton and states that the regional priorities for the Singleton LGA include delivering the Branxton Subregional Plan, investigating the region-shaping potential of the Hunter Expressway and supporting tourism and agriculture by conducting a land use assessment across the Viticulture CIC. The Hook property and its surrounds have not been mapped in any strategic planning documents as being important from a regional conservation planning or environmental corridor perspective. Furthermore, while the property is likely to be Category 2 Regulated Land under the LLS Act, it is not mapped on the NSW Biodiversity Values Map whereby a specific biodiversity assessment and offsets would be required for vegetation clearance. Should development expand in this area, some of the land surrounding the Hook property has already been neutralised for other purposes including within Belford National Park to the north, Huntlee development and offsets to the east and the 35,000-hectare Singleton Military Area to the west. While no specific development proposals are stated for the Hook property there are also no formal protection mechanisms or published intentions for preserving the biodiversity features on the property. The likelihood of consequential total loss of the CEEC on the site due to residential development, agricultural, or viticultural expansion is considered to be <i>unlikely</i> in the next 20 years, but certainly not impossible. Degradation through continued agriculture and permitted firewood collection is currently permissible. Following discussions with DAWE and reference to 'Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act' (UoQ 2017), a risk of loss of 5% without the offset was approved by DAWE and accepted by HVO.
Risk of Loss With Offset	0%	The risk of total loss of the CEEC with an in-perpetuity conservation mechanism and management actions is considered <i>exceptionally unlikely</i> as per the categories of likelihood in the Confidence and Likelihood in the IPCC Fifth Assessment Report Factsheet (DoE).
Time Over Which Loss is Averted	20 years	Proposed in perpetuity offset – maximum entry is 20 years.
Time Until Ecological Benefit	10 years	Woodland at Hook is threatened by highly invasive weeds. Active management to remove and reduce the spread of African olive will improve its vegetation and habitat condition. It is reasonable to suggest that the woodland can improve its quality by one point in 10 years (and decrease by one point in 10 years).

Input	Score	Justification
Confidence in Loss	100%	Very high confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the CEEC will be prevented. The risk of loss without the offset is also unlikely due to the State and Commonwealth assessment process required to clear highly threatened vegetation, however this is possible.
Confidence in Quality Change	85%	High confidence for the proposed quality score changes following active weed control.
Quantum of Offset	7.27	Refer to Attachment 2.
Regeneration		
Offset Area	28.3 ha	N/A
Offset Site Start Quality	5	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): - Site Condition Score (out of 7) = 3.28 - Site Context Score (out of 3) = 1.26 Total = <u>4.54</u> (rounded to 5) The regeneration is in moderate condition and conforms to the CEEC as outlined in the Conservation Advice, however the community is in early stages of regeneration. Understory and ground cover also need further development as canopy species establish. The regeneration is subject to disturbances from weeds, including the highly invasive African olive and the contraindicative species <i>Eucalyptus fibrosa</i> occurs in the locality. While this represents a good quality patch of CEEC, improvements are possible.
Without Offset Quality	4	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): - Site Condition Score (out of 7) = 2.66 - Site Context Score (out of 3) = 1.26 Total = <u>3.92</u> (rounded to 4) Without the offset, the risk of CEEC degradation from African olive is high. The invasion of native vegetation communities by African olive is known to alter ecosystem structure through the formation of a dense mid-canopy resulting in dense shade preventing native groundcover species from growing. Refer to detailed discussion above on the impacts of African olive. Without management, this species is therefore likely to reduce the quality of the woodland by one point over a 20-year period as African olive is not classified as a noxious weed and landowners are not obligated to remove stands from their property.
With Offset Quality	7	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): Site Condition Score (out of 7) = 5.14

Input	Score	Justification
		Site Context Score (out of 3) = 1.39 Total = <u>6.53</u> (rounded to 7) Following the application of active management actions to specifically manage African olive as well as fencing to reduce unwanted access and disturbance, the woodland is likely to improve its quality by two points over a 20-year period.
Risk of Loss Without Offset	5%	As per discussion above.
Risk of Loss With Offset	0%	As per discussion above.
Time Over Which Loss is Averted	20 years	Proposed in perpetuity offset – maximum entry is 20 years.
Time Until Ecological Benefit	20 years	The regenerating woodland at Hook is threatened by highly invasive weeds. Active management to remove and reduce the spread of African olive will improve its vegetation and habitat condition. It is reasonable to suggest that the regeneration can improve its quality by two points in 20 years (and decrease by one point in 20 years).
Confidence in Loss	100%	Very high confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the CEEC will be prevented. The risk of loss without the offset is also unlikely due to the State and Commonwealth assessment process required to clear highly threatened vegetation, however this is possible.
Confidence in Quality Change	85%	High confidence for the proposed quality score changes following active weed control.
Quantum of Offset	2.10	Refer to Attachment 2.
Derived Native Grassland		
Offset Area	2.6 ha	N/A
Offset Site Start Quality	3	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): - Site Condition Score (out of 7) = 1.53 - Site Context Score (out of 3) = 1.26 Total = <u>2.79</u> (rounded to 3) The grasslands are in low condition and do not currently conform to the CEEC. This area contains sporadic woodland patches with similar species composition to the surrounding CEEC woodland with recruitment of small trees and saplings occurring. While primarily native, the grasslands contain substantial exotic groundcover. Despite this, this area has been subject to past disturbances and would have previously conformed to the CEEC as per the surrounding woodland and regenerating areas. Improvement to this area is possible with weed control and supplementary planting to restore the CEEC.

Input	Score	Justification
Without Offset Quality	2	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): - Site Condition Score (out of 7) = 1.22 - Site Context Score (out of 3) = 1.26 Total = <u>2.48</u> (rounded to 2) Without the offset, the status of this grassland in relation to the CEEC is highly likely to decrease over a period of 20 years due to African olive invasion. Refer to detailed discussion above on the impacts of African olive.
With Offset Quality	5	BBAM metrics entered into DAWE spreadsheet (refer to Attachment 1): - Site Condition Score (out of 7) = 3.43 - Site Context Score (out of 3) = 1.26 Total = <u>4.69</u> (rounded to 5) Following the application of active management actions to specifically manage African olive as well as supplementary planting and fencing to reduce unwanted access and disturbance, the grassland is likely to be restored to CEEC its quality by two points over a 20-year period (i.e., similar to the start quality of the regeneration areas).
Risk of Loss Without Offset	5%	As per discussion above.
Risk of Loss With Offset	0%	As per discussion above.
Time Over Which Loss is Averted	20 years	Proposed in perpetuity offset – maximum entry is 20 years.
Time Until Ecological Benefit	20 years	Active management to remove and reduce the spread of weeds and supplementary planting of CEEC canopy species will assist in the regeneration of the community and improve its vegetation and habitat condition. It is reasonable to suggest that the regeneration can improve its quality by two points in 20 years.
Confidence in Loss	100%	Very high confidence that the risk of loss with the offset will be nil. Securing the offset provides a high level of certainty that a total loss of the grassland will be prevented. The risk of loss without the offset is also unlikely due to the State and Commonwealth assessment process required to clear highly threatened vegetation, however this is possible.
Confidence in Quality Change	85%	High confidence for the proposed quality score changes following active weed control.
Quantum of Offset	0.10	Refer to Attachment 2.

4.4 Outcomes for the Swift Parrot

Condition 4 of EPBC 2016/7640 requires that the Wandewoi property is secured as an offset for CHVEFW CEEC and swift parrot including:

- 175.8 ha of swift parrot foraging habitat (woodland) and
- 40 ha of regenerating swift parrot foraging habitat (DNG).

While the proposed variation to Condition 4 (the reduction of 230 ha of grassland restoration at Wandewoi to 59.8 ha) still covers the requirement above, the swift parrot listing status under the EPBC Act has changed from endangered to critically endangered. As a result, the newly proposed offset package offers a substantially higher offset outcome for the species. The variation to the offset package in relation to Condition 4 now includes:

- 175.8 ha of swift parrot foraging habitat (woodland) at Wandewoi
- 61.0 ha of regenerating swift parrot foraging habitat (DNG) at Wandewoi and
- 121.5 ha of swift parrot foraging habitat (woodland) at Hook.

Furthermore, the habitat quality for the swift parrot at the Hook property is substantially higher than the Wandewoi grassland that has been replaced by the woodland habitats at Hook. A high number of records of the species has been recorded in recent years foraging within 2km of the Hook property. The locality surrounding Hook has proven to be an area frequented by the swift parrot with recent records around Huntlee and also in the adjacent Singleton Military Area ([Birdline 2019](#)).

The revised offset strategy secures 121.5 hectares of likely foraging habitat into in-perpetuity conservation within 2km of known habitat and frequent records of the species. Securing this area will assist in managing and protecting swift parrot foraging habitat at the landscape scale, which is a key strategy in the [Draft National Recovery Plan for the Swift Parrot](#) (CoA 2019).

The approved quantum of impact for the swift parrot is **40.86**. A summary of the updated assessment outcomes for swift parrot is outlined in **Table 4** below and detailed in **Attachment 2**. As agreed by DAWE and HVO, the listing status for swift parrot remained unchanged for the assessment of the woodland component at Wandewoi (which is unchanged from the original approval). The listing status and risk of loss scores have been amended for any subsequent assessments relating to the variation.

The variation for Condition 4 of EPBC 2016/7640 results in 358.3 ha of swift parrot foraging habitat (increased from the originally approved 215.8 ha) and an offset quantum of **42.3**.

Table 4 – Summary of the Updated Assessment Outcomes for Swift Parrot

Offset Site	Foraging Habitat Condition	Area (ha)	Net Value (Offset Quantum)
Wandewoi	Woodland	175.8	31.84
	Derived Native Grassland (to be restored)	61.0	4.06
Hook	Woodland	121.5	6.40
TOTAL		358.3	42.3

5.0 Summary and Conclusion

As outlined in the assessments above, the revised offset strategy provides an adequate offset quantum to replace the original offset strategy approved by DAWE. The revised strategy includes a substantial area of existing high quality CHVEFW CEEC and swift parrot foraging habitat.

The total quantum of offset provided by the revised offset strategy for the CHVEFW CEEC is **29.34** and includes:

- 19.39 offset quantum at the Wandewoi Offset Site
- 9.47 offset quantum at the Hook Offset Site and
- 0.48 offset quantum at the Mitchelhill Offset Site.

The total quantum of offset provided by the revised offset strategy for the swift parrot is **42.3** and includes:

- 35.9 offset quantum at the Wandewoi Offset Site and
- 6.4 offset quantum at the Hook Offset Site.

6.0 References

Birdline NSW (2019) Recent bird sightings -

<http://www.ereamae.com/BirdlineRecentSightings.aspx?Birdline=2>

Commonwealth of Australia (CoA) (2019) National Recovery Plan for the Swift Parrot (*Lathamus discolor*), Draft January 2019, <http://www.environment.gov.au/system/files/consultations/00802df7-5a57-4e78-a7e1-261d6d444ba2/files/draft-recovery-plan-swift-parrot.pdf>

Cuneo P, Leishman MR (2006) African Olive (*Olea europaea* subsp. *cuspidata*) as an environmental weed in eastern Australia: a review. *Cunninghamia* 9, 545-577.

<https://www.rbgsyd.nsw.gov.au/getmedia/30899daf-6401-4e1a-8be3-8fcc3672a79f/Cun94Cun545sm.pdf.aspx>

Department of the Environment (DoE) (2015). Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community -

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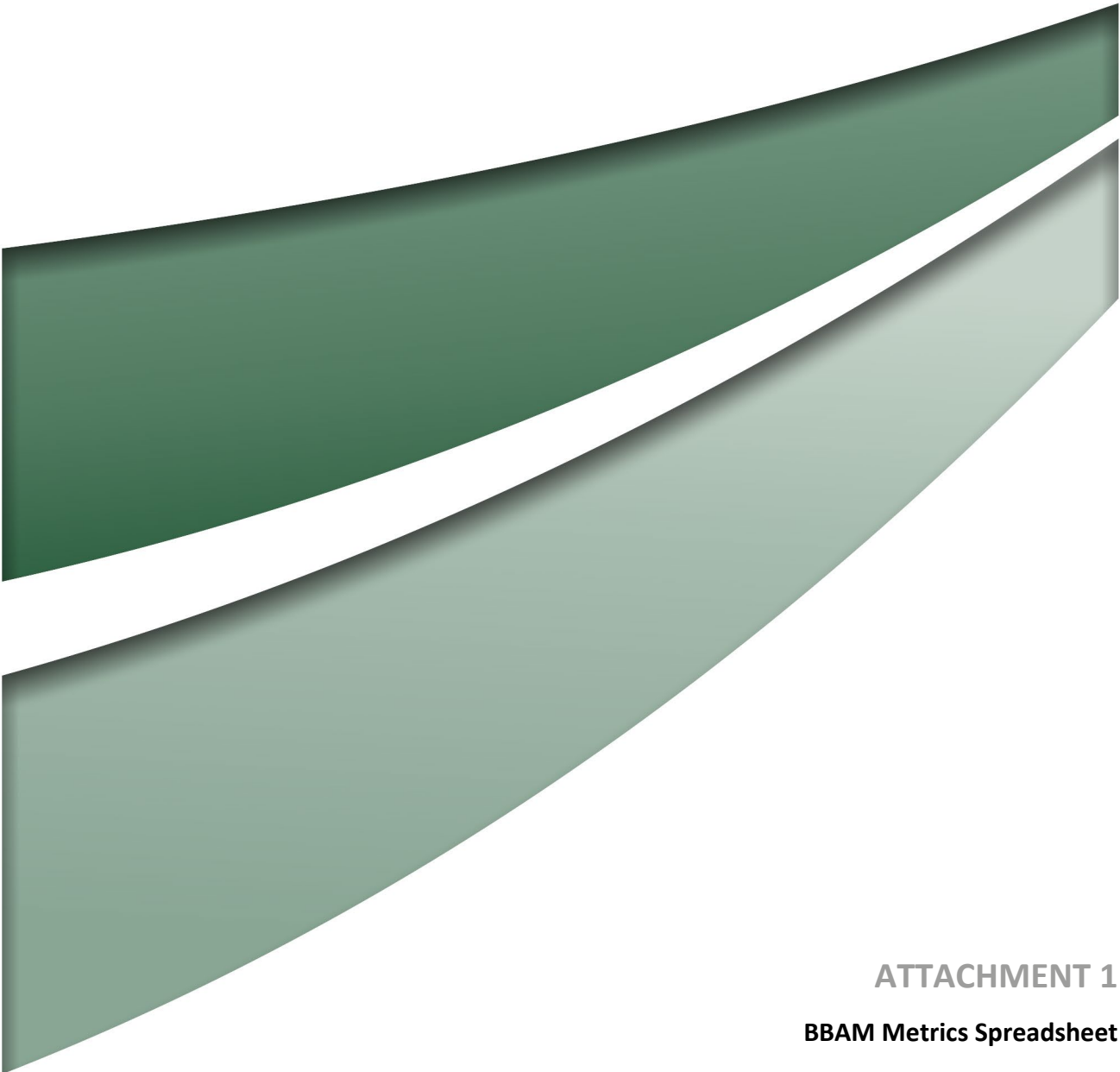
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ATTACHMENT 1

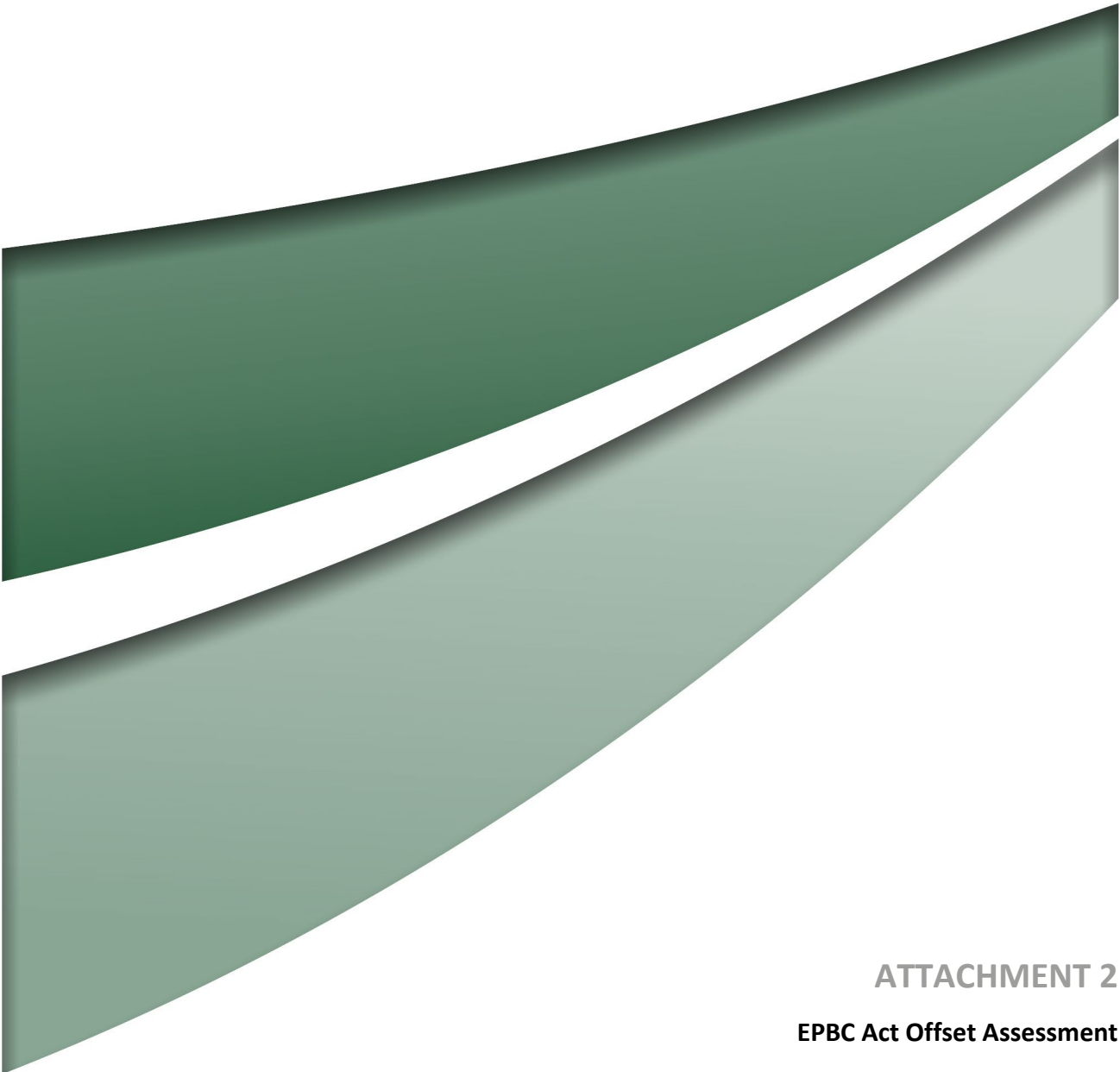
BBAM Metrics Spreadsheet

Hook Offset Site CHVEFW CEEC

SITE CONDITION METRICS		Veg Zone 1 - HU815 Woodland 78.6 ha							Veg Zone 2 - HU815 Regeneration 28.3 ha						Veg Zone 3 - HU815 Grassland 2.6 ha				
BBAM Data	Benchmark	P02	P03	P04	P06	P08	Plot Average	Benchmark	P01	P05	Q01	Q02	Plot Average	Benchmark	P07	Q03	Q04	Plot Average	
Native Species Richness	38	24	24	19	17	23	21.4	38	25	10	24	29	22.0	38	7	18	16	13.7	
Native Overstorey Cover (%)	15 to 40	16	20.5	15	43	50	28.9	15 to 40	16.5	7	0	19.5	10.8	15 to 40	0	0	0.5	0.2	
Native Midstorey Cover (%)	4 to 40	0.5	2.7	0	0	0	0.6	4 to 40	0.1	0	5	0	1.3	4 to 40	0	0	0	0.0	
Native Groundcover (Grasses)	30 to 60	28	38	38	68	58	46.0	30 to 60	66	8	14	48	34.0	30 to 60	28	48	50	42.0	
Native Groundcover (Shrubs)	3 to 15	8	0	0	0	0	1.6	3 to 15	2	0	10	0	3.0	3 to 15	0	0	0	0.0	
Native Groundcover (Other)	10 to 25	18	10	28	4	28	17.6	10 to 25	18	0	14	16	12.0	10 to 25	12	46	26	28.0	
Exotic Plant Cover	0	0.5	4.5	0.5	12	16	6.7	0	3	92	36	0	32.8	0	92	0	10	34.0	
Number of Trees with Hollows	1.2	0	0	0	2	0	0.4	1.2	0	0	0	0	0.0	1.2	0	0	0	0.0	
Overstorey Regeneration	1	1	1	1	1	1	N/A	1	1	1	1	1	N/A	1	1	1	1	N/A	
Fallen Logs (m)	10	33	20	7	7	32	19.8	10	0.5	0	0	7	1.9	10	0	7	8	5	
							Calculator Output						Calculator Output					Calculator Output	
Site Value Score (/100)							62.67						46.88					21.88	
Site Value Score (%)							62.67						46.88					21.88	
Site Condition Score Weighting							7						7					7	
Site Condition Score							4.39						3.28					1.53	
Future Site Value (without offset) (/100)							50.09						38.02					17.45	
Site Condition Score (without offset)							3.51						2.66					1.22	
Future Site Value (with offset and management) (/100)							83.85						73.44					48.96	
Site Condition Score (with offset and management)							5.87						5.14					3.43	

SITE CONTEXT METRICS	Current	Without	With
Native Vegetation Cover Change	0	0	2.12
Strategic Value Score	9	9	9
Patch Size Score	12	12	12
Landscape Value Score (/50)	21	21	23.12
Landscape Value Score (%)	42	42	46.24
Site Context Score Weighting	3	3	3
Site Context Score	1.26	1.26	1.39

Current Quality Score	Woodland	Regen	Grassland
Site Condition Score (out of 7)	4.39	3.28	1.53
Site Context Score (out of 3)	1.26	1.26	1.26
Quality Score	5.65	4.54	2.79
Quality Score (rounded)	6	5	3
Quality Score Without Offset	Woodland	Regen	Grassland
Site Condition Score (out of 7)	3.51	2.66	1.22
Site Context Score (out of 3)	1.26	1.26	1.26
Quality Score	4.77	3.92	2.48
Quality Score (rounded)	5	4	2
Quality Score With Offset	Woodland	Regen	Grassland
Site Condition Score (out of 7)	5.87	5.14	3.43
Site Context Score (out of 3)	1.39	1.39	1.26
Quality Score	7.26	6.53	4.69
Quality Score (rounded)	7	7	5



ATTACHMENT 2
EPBC Act Offset Assessment

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	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																							
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	Yes	3.96	Adjusted hectares	Hook (DNG)	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	2.6	Risk of loss (%) without offset	5%	Risk of loss (%) with offset	0%	0.13	100%	0.13	0.03	0.10	2.65%	No			
										Future area without offset (adjusted hectares)	2.5	Future area with offset (adjusted hectares)	2.6										
						Time until ecological benefit	30	Start quality (scale of 0-10)	3	Future quality without offset (scale of 0-10)	2	Future quality with offset (scale of 0-10)	5	3.00	85%	2.55	0.35						
	Threatened species habitat																						
	Area of habitat	No				Time over which loss is averted (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)											
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	0.10	2.65%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

Offsets Assessment Guide	
For use in determining offsets under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> 2 October 2012	
This guide relies on Macros being enabled in your browser.	

Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																									
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	Yes	3.96	Adjusted hectares	Hook (Regen)	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	28.3	Risk of loss (%) without offset	5%	Risk of loss (%) with offset	0%	1.42	100%	1.42	0.38	2.10	53.15%	No					
						Time until ecological benefit	20	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	4	Future quality with offset (scale of 0-10)	7									3.00	85%	2.55	0.68
	Threatened species habitat																								
	Area of habitat	No				Time over which loss is averted (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset													
						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)													
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	2.10	53.15%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#DIV/0!

Offsets Assessment Guide

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

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Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF Riverview	Area	31.7	Hectares	PD
				Quality	8	Scale 0-10	
				Total quantum of impact	25.36	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																								
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	Yes	25.36	Adjusted hectares	Hook (Woodland)	Risk-related time horizon (max. 20 years)		20	Start area (hectares)	78.1	Risk of loss (%) without offset		5%	Risk of loss (%) with offset		0%	3.91	100%	3.91	1.05	7.27	28.65%	No	
						Future area without offset (adjusted hectares)		74.2	Future area with offset (adjusted hectares)		78.1													
						Time until ecological benefit		10	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)		5	Future quality with offset (scale of 0-10)		7								
	Threatened species habitat																							
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	25.36	7.27	28.65%	No	\$0.00	#DIV/0!	#DIV/0!
						\$0.00	#DIV/0!	#DIV/0!

Offsets Assessment Guide

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Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	3.96	Adjusted hectares	MitchellHill	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	3.4	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	90%	0.00	0.00	0.48	12.01%	No		
										Future area without offset (adjusted hectares)	3.4	Future area with offset (adjusted hectares)	3.4									
						Time until ecological benefit	10	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	9	3.00	90%	2.70	1.40					
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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					
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	0.48	12.01%	No	\$0.00	#DIV/0!	#DIV/0!
						\$0.00	#DIV/0!	#DIV/0!

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
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Matter of National Environmental Significance	
Name	CHVEF
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Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF Riverview	Area	22.7	Hectares	PD
				Quality	8	Scale 0-10	
				Total quantum of impact	18.16	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	18.16	Adjusted hectares	MitchellHill	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	129.86	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	90%	0.00	0.00	18.16	100.00%	Yes		
						Future area without offset (adjusted hectares)	129.9	Future area with offset (adjusted hectares)	129.9													
						Time until ecological benefit	10	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	9									
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	18.16	18.16	100.00%	Yes	\$0.00	N/A	\$0.00
							\$0.00	\$0.00

Offsets Assessment Guide
For use in determining offsets under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> 2 October 2012
This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF West Pit	Area	6.6	Hectares	PD
				Quality	6	Scale 0-10	
				Total quantum of impact	3.96	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																						
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	Yes	3.96	Adjusted hectares	Wandewoi (DNG)	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	61	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	10%	12.20	80%	9.76	2.62	3.16	79.86%	No		
						Future area without offset (adjusted hectares)	42.7	Future area with offset (adjusted hectares)	54.9													
						Time until ecological benefit	30	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	8									
	Threatened species habitat																					
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	3.96	3.16	79.86%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#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	CHVEF
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	Yes	CHVEF Riverview	Area	31.7	Hectares	PD
				Quality	8	Scale 0-10	
				Total quantum of impact	25.36	Adjusted hectares	
	Threatened species habitat						
	Area of habitat	No		Area			
				Quality			
				Total quantum of impact	0.00		
	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																								
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	Yes	25.36	Adjusted hectares	Wandewoi (Woodland)	Risk-related time horizon (max. 20 years)		20	Start area (hectares)	175.8	Risk of loss (%) without offset		30%	Risk of loss (%) with offset		10%	35.16	80%	28.13	7.55	16.23	64.02%	No	
						Future area without offset (adjusted hectares)		123.1	Future area with offset (adjusted hectares)		158.2													
						Time until ecological benefit		10	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)		6	Future quality with offset (scale of 0-10)		8								
	Threatened species habitat																							
	Area of habitat	No				Time over which loss is averted (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)										
	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								
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	0				\$0.00		\$0.00
	Area of community	25.36	16.23	64.02%	No	\$0.00	#DIV/0!	#DIV/0!
							\$0.00	#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	Swift Parrot
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
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	Swift Parrot Impacts	Area	68.1	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	40.86	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																						
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	0.0	Risk of loss (%) with offset	0.0									
										Future area without offset (adjusted hectares)		Future area with offset (adjusted hectares)										
						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	40.86	Adjusted hectares	Hook (Woodland)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	121.5	Risk of loss (%) without offset	5%	Risk of loss (%) with offset	0%	6.08	100%	6.08	1.63	6.40	15.68%	No		
										Future area without offset (adjusted hectares)	115.4	Future area with offset (adjusted hectares)	121.5									
						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)	7	2.00	85%	1.70	0.46					
	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								
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	40.86	6.40	15.68%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#DIV/0!

Offsets Assessment Guide	
For use in determining offsets under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> 2 October 2012	
This guide relies on Macros being enabled in your browser.	

Matter of National Environmental Significance	
Name	Swift Parrot
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

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

Impact calculator							
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	Swift Parrot Impacts	Area	68.1	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	40.86	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																					
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									
									0.0	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	40.86	Adjusted hectares	Wandewoi (DNG)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	61	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	10%								
									42.7	54.9	12.20	80%	9.76								
						Time until ecological benefit	20	Start quality (scale of 0-10)	2	Future quality without offset (scale of 0-10)	2	Future quality with offset (scale of 0-10)	5								
	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								
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	40.86	4.06	9.93%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#DIV/0!

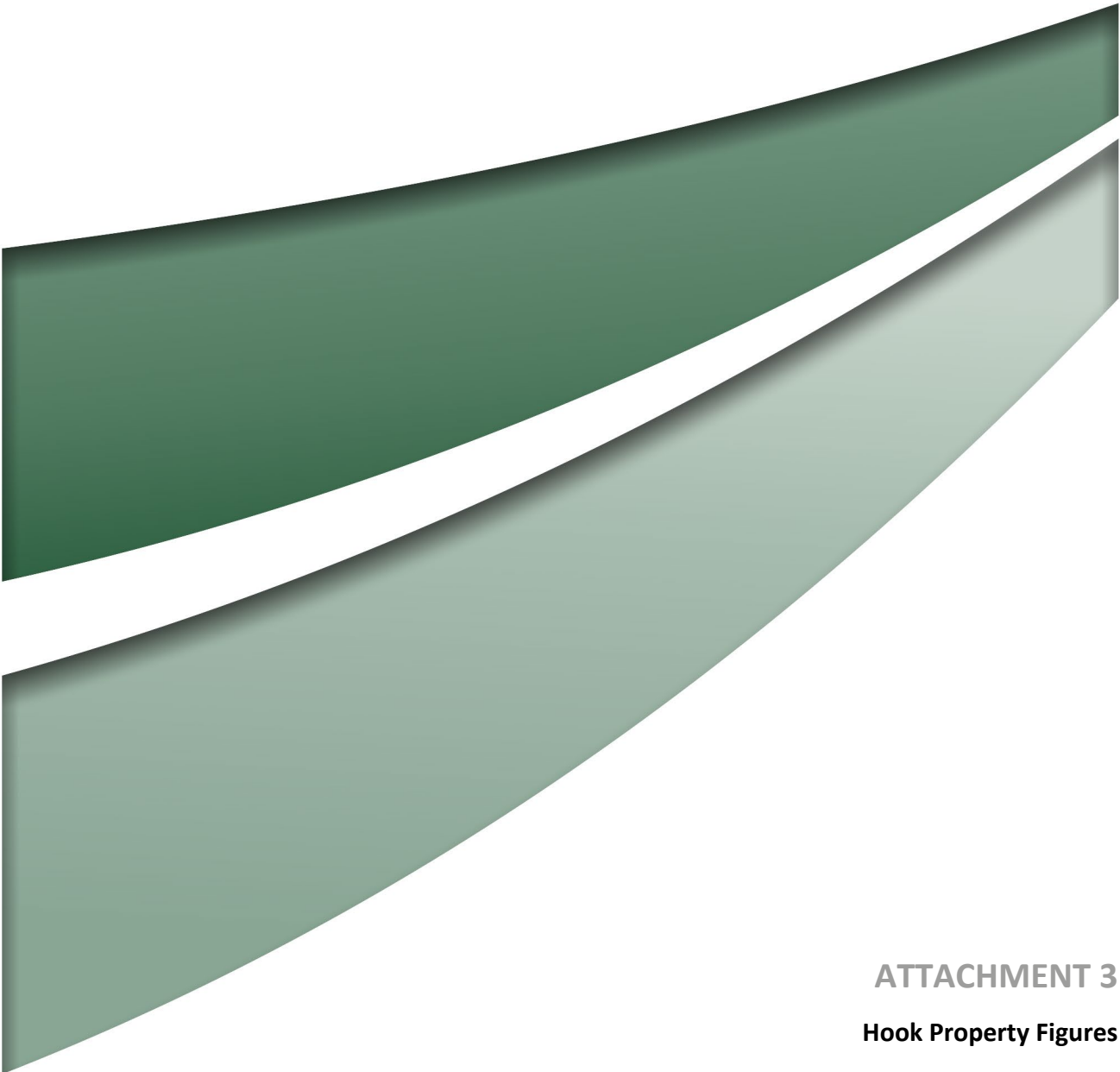
Matter of National Environmental Significance	
Name	Swift Parrot
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

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

Impact calculator							
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	Swift Parrot Impacts	Area	68.1	Hectares	
				Quality	6	Scale 0-10	
				Total quantum of impact	40.86	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																						
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	0.0	Risk of loss (%) with offset	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	40.86	Adjusted hectares	Wandewoi (Woodland)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	175.8	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	10%	35.16	80%	28.13	22.16	31.84	77.94%	No		
						Time until ecological benefit	5	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	4	Future quality with offset (scale of 0-10)	6	2.00	80%	1.60	1.51					
	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								
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	40.86	31.84	77.94%	No	\$0.00	#DIV/0!	#DIV/0!
	Area of community	0				\$0.00		\$0.00
							\$0.00	#DIV/0!



ATTACHMENT 3

Hook Property Figures

Hunter Valley Operations

Vegetation communities and offsets at the Hook Biodiversity Area

Biodiversity Offset Strategy 2024: EPBC 2016-7640



Figure 4.6



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