



Compensatory Habitat Package

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GULLEN RANGE WIND FARM



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1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

This document provides a revised version of the Gullen Range Wind Farm (GRWF) Compensatory Habitat Package (CHP) that was approved by Department of Planning and Environment (DPE) in September 2012. The CHP is required by Approval Condition 2.35 of the Project Approval. The implementation of the offset described in the CHP is proposed to be via a Conservation Property Vegetation Plan (CPVP) to be formalized in consultation with Office of Environment and Heritage (OEH) and with the involvement of Local Land Services (LLS) as the agency that registers CPVP's under the provisions of the Native Vegetation Act, 2003.

Consultation has been undertaken with OEH to prepare the approved CHP and for subsequent revision to prepare this revised CHP. On the basis of the consultation, the proponent, New Gullen Range Wind Farm Pty Ltd (NGRWF) has offered to expand the offset area defined in the CHP that was approved in 2012. A revised CHP was provided to OEH in September 2014 and an updated version in March 2015 reflecting additional mapping results. This CHP has been further revised based on the need for minor boundary adjustments to align the boundaries of the offset site with surveyed property boundaries and reflect on ground fencing practicalities.

Draft documentation for a proposed CPVP will be submitted to OEH and LLS with a copy to Department of Planning and Environment (DPE). It was also considered appropriate to provide this updated CHP despite a CHP having already been approved. The revised document utilizes additional assessment information, addresses outcomes of OEH consultation and describes the offset that is currently proposed to be implemented via a CPVP. As the offset in this revised CHP is greater than that for the approved CHP (2012) it is not considered that it conflicts with the approved CHP and, beneficially provides a much improved conservation outcome.

This CHP describes the process for development of the revised offset area, its characteristics and proposed management zones and actions that are to be included in the CPVP.

1.2 BACKGROUND

The Gullen Range Wind Farm (GRWF) project involves the construction and operation of 73 wind turbines at Gullen Range in the Southern Tablelands region of NSW. Construction commenced in September 2012 and full operation commenced in December 2014.

The GRWF project was assessed under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and was approved by the NSW Land and Environment Court on the 4th of August 2010 subject to Project Approval conditions.

Project Approval Condition 2.35 required that the proponent prepare “a compensatory habitat package to offset in perpetuity the value of habitat lost as a result of the project”. A CHP was prepared by NGH Environmental Pty Ltd on behalf of the proponent and in consultation with OEH. The CHP was subsequently approved by DPE on 10 September 2012 subject to four conditions set out in DPE's letter.

This version of the CHP has been updated following validation of impact areas for native vegetation (conducted July 2014) and to address outcomes of consultation with OEH during 2014.

The GRWF Bird and Bat Adaptive Management Plan (BBAMP) addresses the ongoing monitoring and adaptive management for avifauna in the vicinity of the project. This CHP provides for conservation of known habitat for species such as Powerful Owl, Wedge-tailed Eagle and potentially Little Eagle, if present.

It is noted that a Modification Application was lodged for the project, in March 2014, under Section 75W of the EP&A Act. The modification related to changes to specific turbine locations. This involved adjustments from the approved indicative locations to as-built locations based on detailed design and further consideration of site specific construction, engineering and environmental constraints. In July 2014, the DPE recommended approval of the modification subject to recommended conditions. The determination of the modification application was referred to the Planning Assessment Commission (PAC) and on 2 October 2014, PAC refused the application. On 6 March 2015, the Land and Environment Court, by Consent, set aside the decision of the PAC leaving the modification undetermined. The modification was referred back to the DPE.

The DPE provided a revised assessment of the modification in May 2015 recommending that the application be approved. The modification was approved on the 7 September 2015 subject to some amendments to the conditions. Condition 2.3.5 was amended to include, in general, revision of the CHP in consultation with OEH by 31 December 2015. The March 2015 version of the revised CHP was endorsed by OEH meeting this condition of consent.

This revised CHP provides an opportunity for further consultation with OEH to agree management measures that can be integrated in the final CPVP and provide a basis for implementation of the offset.

1.3 LOCATION

The Gullen Range Wind Farm is located along a north-south running ridge system of the Great Dividing Range between Gunning, Crookwell and Goulburn in NSW's southern tablelands. The wind farm occurs across four different precincts. All four precincts where infrastructure would be installed, Kialla, Bannister, Pomeroy and Gurrundah, are located on private property within and adjacent to mainly agricultural areas used for sheep and cattle grazing. As well, residential dwellings and two commercial operations (chicken farms) are located nearby. In general, the locations can be characterised as grassland ridges and flats with woodland and forest patches on slopes and in gullies. The nearest township is that of Grabben Gullen, with larger towns including Crookwell, Gunning, Breadalbane and Goulburn in the region.

A significant area of woodland is located to the east of the Pomeroy Group of turbines and part of this woodland has been included within the proposed offset area. The area selected for the proposed offset has significant conservation value.

1.4 LEGISLATIVE CONTEXT

An Environmental Assessment to assess the potential environmental impacts of the wind farm was undertaken by NGH Environmental in 2008 (EA; NGH Environmental 2008a). A Biodiversity Assessment (BA; NGH Environmental 2008b) was prepared as part of the assessment. The BA forms a key source document for this plan.

The Gullen Range Wind Farm is subject to the conditions specified in Annexure A of the Land and Environment Court Order (L&ECO), 4 August 2010. Conditions relevant to this package included:

L&ECO Condition 2.35:

"Prior to the commencement of construction of the project, the Proponent shall in conjunction with the DECC, finalise (and following approval) implement a compensatory habitat package to offset in perpetuity the value of habitat lost as a result of the project, to the satisfaction of the Director General. Unless otherwise agreed to by the Director General, the package shall comprise:

- a) *A minimum of 2:1 'like for like' offset of the vegetation communities to be removed or otherwise disturbed on site utilising a "Worst Case Scenario" impact assessment; or*
- b) *The implementation of in kind management measures or funding for such measures as agreed to by DECC; or a combination of the measures specified in a) and b)."*

As part of the Modification Application process, DPE recommended approval of the modification in July 2014, subject to draft conditions which included the replacement of the L&ECO Condition 2.35 above. The DPE recommended draft condition addressed areas of concern that were identified by OEH. NGRWF accepted the intent and objectives of the recommended conditions and addressed them as part of the March 2015 CHP revision. As this recommended condition provided the basis for the current CHP, details of how this CHP addressed the specific requirements of the recommended condition are provided in Table 1-1 together with explanations of proposed variations to provide practical and effective means of achieving the objectives of the proposed condition.

Following final approval of the modification in September 2015, Consent Condition 2.35 was amended to:

"By the 31 December 2015, unless otherwise agreed with the Secretary, the Proponent shall revise the proposed compensatory habitat package to offset in perpetuity the value of habitat lost as a result of the project, in consultation with OEH, and to the satisfaction of the Secretary. Unless otherwise agreed to by the Secretary, the package shall comprise:

- a) *A minimum of 2:1 'like for like' offset of the vegetation communities to be removed or otherwise disturbed on site utilising a "Worst Case Scenario" impact assessment; or*
- b) *The implementation of in kind management measures or funding for such measures as agreed to by OEH; or a combination of the measures specified in a) and b)."*

The March 2015 version of the revised CHP was endorsed by OEH meeting this condition of consent.

Table 1-1 Recommended draft condition 2.35 and status for the revised CHP.

Aspect of DPE Recommended draft condition 2.35	Description of proponent's response in this CHP to the specific DPE aspect in the recommended Condition 2.35 and reason for any changes from the draft condition.
<p>a. <i>Within 6 months of the date of determination of modification 1, the Proponent shall in consultation with the Office of Environment and Heritage (OEH), finalise (and following approval implement all the actions of the package within 3 months or as otherwise agreed to by OEH) a revised compensatory habitat package (CHP) to offset in perpetuity the value of habitat lost as a result of the project, to the satisfaction of the Secretary. Unless otherwise agreed to by the Secretary, the package shall comprise, but not necessarily be limited to:</i></p>	<p>This CHP satisfies this requirement.</p>
<p>i. <i>a minimum of 2:1 'like for like' offset of the vegetation communities to be removed or otherwise disturbed on site utilising a "Worst Case Scenario" impact assessment.</i></p>	<p>The proposed offset area does not contain all vegetation types impacted. It is considered to provide a 'like for better' outcome with regard to the protection of vegetation of conservation value as discussed in Section 3.3.</p>
<p>ii. <i>an extended area of box gum woodland, determined in consultation with OEH.</i></p>	<p>This revised CHP includes extended areas of Box-Gum Woodland determined in consultation with OEH</p>
<p>iii. <i>measures to prohibit rabbit baiting within the foraging areas of the Little Eagle that is within the vicinity of any turbines (to be determined in consultation with OEH).</i></p>	<p>No rabbit baiting will be allowed within the offset area or within land owned by the operator at Pomeroy precinct. This requirement is included in the suggested management measures in Section 3.5.</p>
<p>iv. <i>measures to actively rehabilitate any Box Gum Woodland within the offset area to within the NSW Vegetation Biometric benchmark level for Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands in the Hawkesbury Nepean CMA. This rehabilitation must be within benchmark by June 2019.</i></p>	<p>The date at which the offset area is established and active management begins is not fixed. Also the success of rehabilitation depends on climatic conditions beyond the control of the proponent. It is considered reasonable that demonstrating a substantial improvement over a five year time frame whilst considering the climatic conditions, meets the objective of the condition.</p> <p>Suitable measures are included in Section 3.5.</p> <p>These measures would aim to have the Box Gum Woodland within or approaching Biometric benchmark level for <i>Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands in the Hawkesbury Nepean CMA</i> within five years of establishment of the offset site, subject to seasonal conditions.</p>

Aspect of DPE Recommended draft condition 2.35	Description of proponent's response in this CHP to the specific DPE aspect in the recommended Condition 2.35 and reason for any changes from the draft condition.
<p>v. <i>no spraying using a boom spray or aerial spraying within the areas of box gum woodland, or within the other areas of the compensatory habitat areas. Spraying for noxious weeds is to be undertaken using a hand held spray device on target species only. Other woody weeds should be removed by hand.</i></p>	<p>There are a number of methods that may be employed that have minimal impact on surrounding environments and removing all woody weeds by hand may not be the most efficient, cost effective or less intrusive approach.</p> <p>Weed control measures are included in Section 3.5. These include:</p> <ul style="list-style-type: none"> • No spraying using a boom spray or aerial spraying within the areas of box gum woodland, or within the other areas of the compensatory habitat areas. • <i>Spraying for noxious weeds is to be undertaken using a hand held spray device on target species only. Other woody weeds should be removed by hand (or suitable alternatives as determined by an expert, in consultation with OEH).</i>
<p>vi. <i>no grazing within the CHP area without consultation with OEH and approval of the Secretary.</i></p>	<p>The exclusion of grazing (unless approved by the Secretary) is included in the suggested management measures in Section 3.5.</p>
<p>vii. <i>a program of feral animal control, including control and removal of feral goats, pigs and foxes. A feral animal control plan is to be developed which clearly outlines the types of control and when the feral animal control will occur.</i></p>	<p>The preparation of a pest control strategy is included in the suggested management measures in Section 3.5.</p>
<p>viii. <i>Protection of the known nesting and roosting area of the Powerful Owl. As such the CHP area is to include all known roosting or nest trees of the Powerful Owl within the project boundary. The boundary of the CHP area must be finalised in consultation with OEH. The nest trees and surrounding habitat should be protected in perpetuity, using either a conservation PVP or biobanking agreement.</i></p>	<p>It is not feasible for the proponent to include the known nesting and roosting area in the CHP area as it is on a neighbouring property. However, this CHP provides a significant protection buffer including key foraging habitat that is located between developed areas and the known nesting and roosting habitat. This buffer will be secured in perpetuity under a conservation PVP and actively managed and restored to support protection of native vegetation communities and maintain its habitat potential for species such as the Powerful Owl. The current CHP boundary has been developed in consultation with OEH and significantly increases the area and conservation values to be protected under the proposed Conservation PVP.</p>

Aspect of DPE Recommended draft condition 2.35	Description of proponent's response in this CHP to the specific DPE aspect in the recommended Condition 2.35 and reason for any changes from the draft condition.
<p><i>ix. Measures for minimising the impact of the windfarm on the Powerful Owl inclusive of the monitoring requirements as stipulated within condition 2.35A.</i></p>	<p>The existing condition 2.33 contains provision for restriction of operation for turbines POM 03, 04, 06 and 07 to avoid risk to Powerful Owl juvenile dispersion. Additionally the Bird and Bat Adaptive Management Program (BBAMP) (required by Condition 3.1) contains provisions for monitoring impacts and for adaptive management.</p> <p>A Powerful Owl Management Strategy (POMS) has also been prepared for the project and will be updated in consultation with DPE/OEH. The POMS will address monitoring requirements.</p>
<p><i>x. a monitoring and reporting program for the CHP area, to be determined in consultation with OEH.</i></p>	<p>A monitoring and reporting program is included in the suggested management measures in Section 3.5 and is expected to be incorporated in the conservation PVP.</p>
<p><i>b. Within 3 months of the date of determination of modification 1, the Proponent shall provide an accurate assessment of the amount and type of vegetation that is impacted by the project, to the OEH and the Secretary.</i></p>	<p>Section 3.1 of this CHP includes the results of a ground validated impact assessment (undertaken in July 2014) and describes the assessment of the suitability of the proposed offset against these verified areas.</p>

Additionally, Statements of Commitment (SoCs) were made within the documents referred to Project Approval Condition 1.1 to address potential environmental impacts associated with the project. SoC 16 and 16a are relevant to this CHP as outlined below.

Statement of Commitment 16:

The Proponent would commit to offsets determined by suitably qualified experts on the basis of the quantum of vegetation to be removed, pending development of the final infrastructure layout. The offset plan would be established in perpetuity.

A Conservation Property Vegetation Plan (CPVP) area has been defined and actions for this area will be finalised in consultation with OEH and CMA.

Statement of Commitment 16a:

A review of impacts during construction will be undertaken and assessed against the offset to ensure that the offset is adequate

This CHP provides the results of the validation of the project's impacts on native vegetation and the strategy for calculating, securing and managing the offset site. The overall objective is to 'maintain or improve' its condition – no loss of value and ideally enhancement of the values. The actions to implement this CHP include:

- securing the land under a CPVP consistent with this CHP,
- finalising a management plan in consultation with the OEH and Local Land Services (LLS) (previously Catchment Management Authority - CMA) to set out the type and timing of management actions, and
- carrying out those actions, in accordance with the registered CPVP.

1.5 CONSULTATION

Consultation in respect of Condition 2.35 has occurred, with NSW Office of Environment and Heritage (OEH), at several stages described below:

Input was sought from OEH at an early stage in the development of the plan. A draft was reviewed by OEH and a formal response was provided on 7th October 2011 (a number of issues were further clarified on the basis of this). OEH advised that overall, they were in support of the package (OEH reference DOC11/44912/12069).

Additionally, the Southern Rivers CMA officer (now LLS) provided information relating to Conservation Property Vegetation Plans (CPVPs) generally, sufficient to inform the development of the strategy provided in Section 4.4 of this document.

Additional consultation was undertaken with the OEH between April and July 2014 and addressed OEH concerns regarding the current condition of the offset area. The concerns included; condition of areas infested with the noxious weed Serrated Tussock (*Nassella trichotoma*) and the management actions to be applied for the offset area. As a result of the consultation, NGRWF revised the boundary of the proposed offset area and updated the management measures. The revised CHP (August 2014) included a validation of the project's impact on native vegetation, a revised description of the offset area, inclusion of an additional management zone and, additional management measures. It was submitted to DPE and OEH in latter half of 2014 with the expectation of further consultation but that did not occur due to the legal

proceedings associated with PAC refusal of the modification application. The PAC decision has since been set aside by the Land and Environment Court.

The March 2015 CHP was revised to address results of the impact validation and matters raised in the draft conditions recommended by the DPE in July 2014 including specific management measures. Primarily, the offset area was significantly increased and additional management requirements added. These revisions were deemed to be appropriate by the OEH and LLS.

Further consultation with the OEH and LLS has been undertaken to confirm the suitability of the current revisions to the CHP for implementation via a CPVP.

1.6 SCOPE OF THIS CHP

The scope of this CHP is to describe the project's impact on native vegetation, the proposed offset and the management measures which are proposed to be integrated in the CPVP. It is intended to fulfil the requirements under the Project Approval Condition 2.35 and to provide guidance on how the offset site should be managed to maintain or improve biodiversity values.

This CHP provides the following:

1. Quantifies the value of habitat removed by the project.
2. Determines if the minimum of 2:1 'like for like' offset of the vegetation communities that have been removed or otherwise disturbed is met, based on the validated final construction footprint.
3. Includes an extended area of Box-Gum Woodland partly determined in consultation with OEH (June 2014) but further extended following the impact validation.
4. Guidance on how the offset site should be managed to maintain or improve biodiversity values including:
 - a. Committing to alternate methods for rabbit control other than baiting.
 - b. Applying measures to actively rehabilitate any Box Gum Woodland within the offset area.
 - c. Committing to the preparation of a weed management plan incorporating measures for weed control other than spraying using a boom spray or aerial spraying.
 - d. The exclusion of grazing in consultation with OEH and the landowners.
 - e. Committing to the preparation of a feral animal control plan, including the control and removal of feral goats, pigs and foxes
 - f. Measures appropriate to protecting any previously identified Powerful Owl or Little Eagle nesting and roosting areas within the offset site.
5. Proposes a monitoring and reporting program for the CHP area, to be determined in consultation with OEH.
6. Reflects OEH review and input and recognizes the ongoing role by OEH.
7. Has been prepared by suitably qualified experts.
8. Sets out a method to achieve in perpetuity, management of the offset site for improved biodiversity outcomes.

Preparation of this CHP has been guided by the OEH document, *Draft Principles for the use of Biodiversity Offsets in NSW*.

The implementation of the Compensatory Habitat Package (CHP) will involve the establishment of a CPVP in consultation with OEH and LLS and an ongoing management program.

2 METHODOLOGY

2.1 GENERAL APPROACH

The following approach was undertaken to ensure that the offset area is appropriate relative to the areas of native vegetation that will be permanently removed by the project.

1. Validate the areas permanently impacted by infrastructure components based on the actual disturbance footprint (July 2014).
2. Calculate the specific areas of vegetation to be permanently removed in terms of:
 - a. Vegetation type.
 - b. Vegetation condition.
 - c. Habitat values (flora and fauna, including estimates of hollow-bearing trees).

Appropriate offsets were investigated by:

1. Validating existing vegetation mapping within the 'proposed offset areas' (confined to the Pomeroy site and defined in Section 3.2). Existing vegetation mapping (Biodiversity Assessment, NGH Environmental 2008) was updated to reflect current condition of vegetation and habitat and any vegetation type changes¹.
2. Calculate the specific area of vegetation proposed to be offset in terms of:
 - a. Vegetation type.
 - b. Vegetation condition.
 - c. Habitat values (flora and fauna, including estimates of hollow-bearing trees).

In defining the extent of the final 'offset site', additional consideration was given to:

- Ensuring that the offset site adequately represents a 2:1 ratio in terms of *actual* permanent impacts from the development.
- Ensuring a 'like for like' or 'like for better' offset (in terms of the conservation significance of habitat to be removed).
- Ensuring appropriate management of the offset site (aiming to 'maintain or improve' its condition – no loss of value).
- Ensuring appropriate security of the offset site (to ensure in-perpetuity retention).

This approach is further detailed below.

¹ Mapping for the offset site has been updated in June 2014 and in January 2015. The June 2014 mapping assessed the approved offset area. The January 2015 survey reviewed the area of Mountain Gum – Broad-leaf peppermint forest and surrounding vegetation to the south-west of the approved offset site that was added to the approved offset area. The mapping in this CHP has been updated to reflect the new information along with the minor boundary adjustments.

2.2 VALIDATION OF VEGETATION TO BE IMPACTED

2.2.1 Assessment tools

The most up to date vegetation mapping was used for the site. This included:

- updates to the original biodiversity assessment (BA; 2008) mapping, updated as part of the preparation of the Flora and Fauna Management Plan (2011)
- mapping of project impact areas in July 2014 (project field validation)

At the time of the field validation, a final infrastructure ('as built') layout was available and was used to assist with validation of permanent impacts. The extent of earthworks was well defined and at various stages of rehabilitation.

2.2.2 Field Assessment

Inspection points

Field work was undertaken from the 28 – 30 July 2014 by two field ecologists (a senior botanist and an ecologist). This timing was considered suitable for determining vegetation types and condition as defined by the Biometric methodology.

Not all areas of impact were inspected. The survey targeted infrastructure sites which:

- involved the clearing of woody vegetation
- contained vegetation known or likely to be derived from EECs
- had changed location since earlier surveys
- were not surveyed in detail during previous fieldwork.

Generally, areas mapped as non-native vegetation (exotic pasture) were not inspected in the field, although some areas were validated to ensure they were still exotic.

Thirty-six sites were inspected on the ground. Approximately 30 – 45 minutes was spent at each infrastructure site verifying and updating existing vegetation mapping and habitat types and condition within the development envelope.

Flora assessment

At each survey site, vegetation was characterised according to community (as defined in the original Biodiversity Assessment for the project), EEC status and condition. In view of the size of the study area and the confirmatory nature of the survey, a qualitative rapid assessment approach was adopted focusing on 3 key indicators of condition; structure, dominance of native species in the groundlayer and non-grass understorey species richness.

Structural formation was assessed at the hectare scale and the floristic survey used standardised 10 minute random meanders in undisturbed vegetation within 30 metres of the edge of the clearing. In most cases, the assignment of vegetation types follows the mapping provided in earlier assessments. Most sites found to be dominated by exotic pasture during previous fieldwork were not surveyed. Where two structural formations were present at the development site (e.g. grassland and woodland), the site has been allocated to the formation which is likely to have made up the majority of the area of the site.

2.2.3 Mapping and calculation of areas

At each survey site visited, the extent of clearing was mapped using a GPS and later uploaded onto an ArcPad tablet. Each turbine and hardstand was mapped as well as areas of disturbance around the hardstands, including cable trenches, cuttings and batters. Temporary impact areas including construction compounds and laydown areas were also mapped.

At representative sites, road and cable trench impact areas were measured using a tape measure and mapped using a GPS.

These areas were then extrapolated for use in any sites which were not inspected on the ground.

A spreadsheet was used to itemize and calculate the infrastructure footprint areas according to the vegetation types in which they occurred. This allowed a precise impact area to be calculated for the project according to vegetation type and condition. In determining the residual impacts of the project that are required to be offset, only permanent vegetation removal was considered including:

- Turbine footings
- Tracks (new and upgrades of existing)
- Substation and control buildings

In addition, where cable trenches, hardstands and construction compounds impact on woodland or forest (i.e. with an existing overstorey) or EEC derived grasslands this is also considered permanent habitat removal. Rehabilitation of these areas is not considered likely to be able to fully replace the biodiversity values lost by the removal of mature trees and native grassland, even where these impacts will be rehabilitated as part of the construction process.

Validated vegetation communities and their condition were mapped and the infrastructure layout overlaid utilising ArcGIS 10.0 to determine precise impact area within each vegetation type and condition category. Up to date Google imagery (which was captured post wind farm construction) was also used to cross-check impact areas.

2.3 DETERMINING THE OFFSET AREA

Guiding principles that were employed to define the offset included:

- A 'like for like' or 'like for better' offset. Areas were selected that provide like or better conservation values, in comparison to the areas being impacted. That is, vegetation of the same conservation status or greater conservation status (clearing of common vegetation type in a modified landscape offset with Endangered Ecological Communities or vegetation within more intact areas).
- Areas will be connected or, enhance landscape connectivity, as much as possible. This will reduce the degradation of edge effects as well as improve usage of the areas as corridors.

A broad envelope for selection of a potential offset site was identified early in the planning process at the Pomeroy site (refer to Figure 4.1), where extensive forest abuts the eastern edge of the project. Based on the results of field surveys undertaken as part of the Biodiversity Assessment for the project, the broader area was known to have generally high biodiversity values. It contains:

- Areas of EEC.
- A small community of a regionally uncommon plant, Argyle Apple (*Eucalyptus cinerea*).

- Diverse flora and fauna habitat (forested slopes and gullies, forest / pasture ecotone).
- Threatened fauna records and confirmed nesting sites (woodland birds, several microbats, Powerful Owl).
- A potential nesting site of the threatened Little Eagle.
- Habitat features of importance to threatened species (gullies, hollow-bearing trees).
- Moderately low level of human disturbance (interior area more intact than peripheral areas).
- An opportunity to enhance connectivity by protecting a habitat link.

Vegetation and habitat values were validated for the majority of this area, using the same methodology as for the impact areas in 2011. Additional validation was conducted in association with an OEH site visit in June 2014 specific to the northern areas of EEC. The currently proposed boundary of the offset site has been extended to the south and overall defined to achieve a:

- Minimum 2:1 offset ratio.
- 'Like for like' or 'like for better' offset, considering both vegetation type and fauna habitat values.

Further validation was conducted in February 2015 in the additional areas now included in the south-west of the offset site.

The eastern boundaries of the offset site are defined by the current project boundary and mark the limit of lands which are owned by the proponent. The previously identified Powerful Owl nest and roosting habitat is located about 400 metres south of the project boundary and beyond the offset area within a neighbouring property. However, the offset area does protect a significant area of foraging habitat for this species.

3 RESULTS

3.1 AREAS TO BE IMPACTED BY THE DEVELOPMENT

3.1.1 *Vegetation communities to be impacted*

Five vegetation communities have been impacted by the development as well as areas of native and exotic dominated pasture. These communities are:

- Apple Box – Yellow Box Woodland
- Broad-leaf Peppermint – Brittle Gum Forest
- Mountain Gum – Broad-leaf Peppermint Forest
- Narrow leaf Peppermint Forest
- Scribbly Gum – Brittle Gum – Broad-leaf Peppermint Forest

These communities are described within the original Biodiversity Assessment, 2008. Within the site boundary, Apple Box – Yellow Box Woodland, Narrow-leaf Peppermint Forest and some occurrences of Mountain Gum – Broad-leaf Peppermint Forest are included within definitions of Endangered Ecological Communities (EEC's) however, the areas of Mountain Gum – Broad-leaf Peppermint Forest that were impacted by the proposal are not considered to comprise an EEC.

Most vegetation types, excluding exotic pasture, were considered to be in moderate to good condition according to the Biometric guidelines. One turbine site (POM 11) was determined to be Apple Box – Yellow Box Grassy Woodland, in Low condition.

3.1.2 Validated impact area

A total of 34.21 hectares of vegetation has been permanently impacted by the development. 68% of the vegetation impacted was either exotic pasture (11.33 ha) or native pasture (11.79 ha). however, approximately 11.09 hectares of woodland/forest and derived grassland has been impacted including 3.36 hectares of Apple Box – Yellow Box Grassy Woodland and 4.27 hectares of Narrow-leaf Peppermint Moist Forest (both EECs) (Table 3-1).

The impacted vegetation is summarized in Table 3-1 below and is quantified in respect of the components of the project in Table 3-1.

Table 3-1 Summary of areas of vegetation impacted by the by the development

Vegetation type	Area removed	Percentage of total vegetation impacted
Exotic pasture	11.33	33
Native Pasture	11.79	34.5
Apple Box Yellow Box Woodland and derived grassland	3.36	10
Broad-leaf Peppermint- Brittle Gum Forest	1.49	4
Mountain Gum-Broad-leaf Peppermint Forest	1.02	3
Narrow-leaf Peppermint Forest and derived grassland	4.27	12.5
Scribbly Gum-Brittle Gum-Broad-leaf Peppermint Forest	0.95	3
Total	34.21	100

In comparison to earlier estimates, the clearing impact has increased by 13.75 hectares. The increase is due to two main factors:

- In the original Biodiversity Assessment (2008) for the project, native pasture was not included as a vegetation type requiring offsets. As a precautionary approach and to ensure that impacts to vegetation of conservation significance (as defined by the current NSW Scientific Committee determinations) are adequately compensated for this validation has included those pastures that now qualify as grasslands derived from EEC vegetation.
- Temporary impacts, where they occur in EEC, woodland or forest areas have been included in the permanent impact calculations.

These changes to the way the clearing is calculated demonstrate a commitment to ensuring that the actual impacts of the project are compensated for and are considered justified in the context of current EEC definitions and the ability to restore temporary impacts to their pre-development state. While it increases the offset requirement, they are considered in keeping with current expectations for the project.

3.1.3 Fauna habitat values

Moist forest

Snow Gum or Ribbon Gum Forest, Narrow-leaf Peppermint Forest and Mountain Gum – Broad-leaf Peppermint Forest are moist forest types and are dominant at Kialla and Bannister sites, where they occur as fragments with moderate habitat connectivity. Across the landscape, this habitat type occurs as isolated clusters of stepping stones (patches of vegetation) mostly associated with drainage lines. Patch size is up to several hectares. The forest is mostly regrowth with scattered mature trees and a low abundance of hollows. The moist forest has a diverse habitat structure and microhabitat types include dense shrubbery, mistletoe and patches of bracken. Native fauna associated with this area include macropods, Common Wombat (*Vombatus ursinus*), and birds such as Buff-rumped Thornbills (*Acanthiza reguloides*), Superb Fairy-wren (*Malurus cyaneus*) and Grey Fantail (*Rhipidura fuliginosa*). Most fauna that use the moist forest would also utilise the surrounding dry forest and woodland matrix.

Dry forest

Pomeroy and Gurrundah are dominated by dry forest types, with moist forest in deep gullies. These are the Broad-leaf Peppermint – Brittle Gum Dry Forest and Scribbly Gum – Brittle Gum – Broad-leaf Peppermint Dry forest communities. The dry forest across the sites is fairly homogenous in canopy structure but mid and understorey stratum varies considerably. Most dry forest is regrowth with clusters of mature and hollow-bearing trees in the gullies and lower parts of steep slopes. The understorey varies from grassy and open on ridgelines and exposed slopes though to dense with shrubs such as Dogwood on sheltered slopes. The ground is mostly rocky with thin soils. Some patches are devoid of fallen timber while other areas have a high abundance of small and large logs, twigs and litter. The dry forest at Pomeroy is well connected, with a very large extent of vegetation to the west and habitat connectivity afforded via stepping stones, woodland and paddock tree matrix and linear corridors. There is a low level of disturbance in the core of the forest, with disturbance levels including grazing pressure and past clearing increasing toward the periphery of the forest. Fauna species observed include Wallaroo (*Macropus robustus*), White-eared Honeyeater (*Lichenostomus leucotis*), Mistletoebird (*Dicaeum hirundinaceum*), Powerful Owl (*Ninox strenua*) and nesting Wedge-tailed Eagles (*Aquila audax*).

Open woodland

Apple Box – Yellow Box Grassy Woodland occurs as fragments along the edges of forest at the southern sites, between forest and cleared land or native pasture. Here the woodland serves an important habitat corridor function, providing a level of connectivity between forest fragments. The woodland areas have a history of disturbance including current and past grazing and clearing. These areas generally have an open understorey, grassy ground cover and low abundance of fallen timber. The overstorey consists mostly of remnant trees although few bear hollows. Microhabitat includes grassy tussocks (including Serrated Tussock *Nassella trichotoma*), open perching areas, scattered hollow-bearing trees and dead wood and dams. Native fauna observed include Brown Quail (*Coturnix australis*), Eastern Grey Kangaroo (*Macropus giganteus*) and Eastern Rosella (*Platycercus eximius*).

Native pasture

Areas of native pasture with scattered mature and regrowth trees occur in the northern part of the site such as Bannister. Native pasture with scattered trees provides a linking habitat matrix between areas of forest. Microhabitats include grassy tussocks (including *Poa* spp.), open perching and foraging areas and

dams. Native pasture provides habitat for a range of species including foraging Wedge-tailed Eagles, Australian Magpie (*Gymnorhina tibicen*), Welcome Swallow (*Hirundo neoxena*), robins (*Petroica* spp.) and finches. Native pasture may also provide habitat for reptiles.

3.2 AREAS TO BE PROTECTED AT THE OFFSET SITE

An initial broad area was nominated from which a suitable offset site could be selected. The broad area extended to lands beyond the project area and consists of a large area of continuous treed vegetation (approximately 314ha, Figure 4.1) and six vegetation communities that include:

- Apple Box – Yellow Box Woodland
- Broad-leaf Peppermint – Brittle Gum Forest
- Mountain Gum – Broad-leaf Peppermint Moist Forest
- Snow Gum or Ribbon Gum Moist Forest
- Scribbly Gum-Brittle Gum-Broadleaf Peppermint Forest
- An area dominated by Argyle Apple

The majority of the vegetation is in moderate to good condition according to the biometric guidelines and the area is known to provide habitat for threatened fauna species. To achieve the required 2:1 ratio required at the offset site only a small proportion of this area (approximately 68.42 hectares) is required.

The proposed offset site (see Figure 4.1) has been selected based on its ability to provide biodiversity outcomes that meet the requirements of the approval conditions for the project. This was able to be accommodated within the project boundary. In total, the proposed offset site comprises approximately 125 hectares of mostly forest or woodland vegetation including:

- Approximately 28.13 hectares of Apple Box – Yellow Box Woodland (EEC)
- Approximately 4.48 hectares of Apple Box – Yellow Box Woodland Derived Grassland (EEC)
- Approximately 83.59 hectares of Broad-leaf Peppermint – Brittle Gum Forest
- Approximately 5.51 hectares of Mountain Gum – Broad-leaf peppermint Forest (EEC)
- Approximately 1.22 hectares of Ribbon Gum Forest
- Approximately 2.09 hectares of exotic dominated derived grassland

The current condition of these vegetation types within the offset site is discussed in the sections below and mapped on Figure 3-2. The condition of each area will be further verified during the collection of baseline data to be used for monitoring status of the PVP over time. The proposed offset site also contains the heads of several gullies from which unnamed creeks traverse the site, generally from north to south (refer Figure 3-2) and are part of the Wollondilly River Catchment.

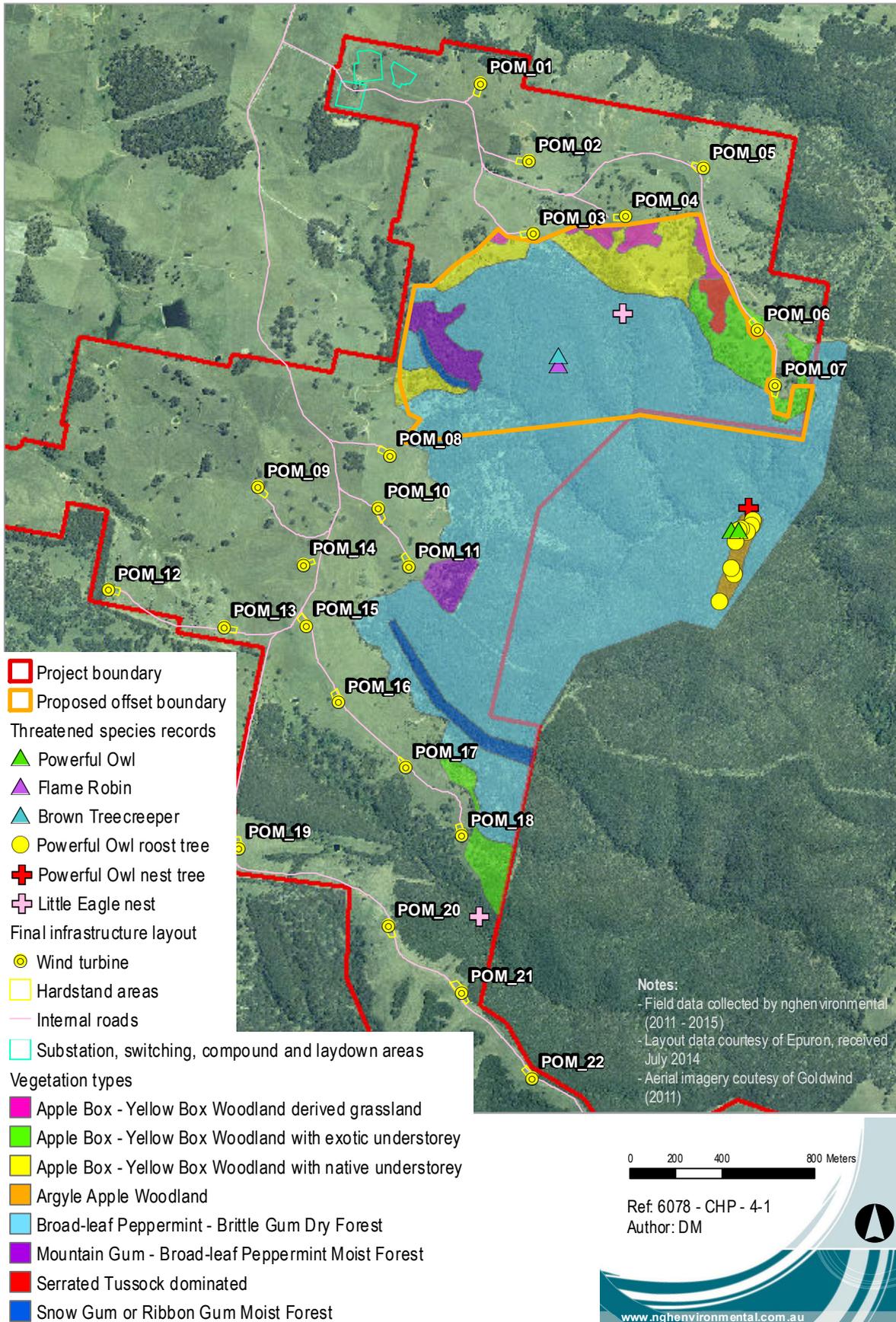


Figure 3-1 Vegetation types within the designated offset area and proposed offset site

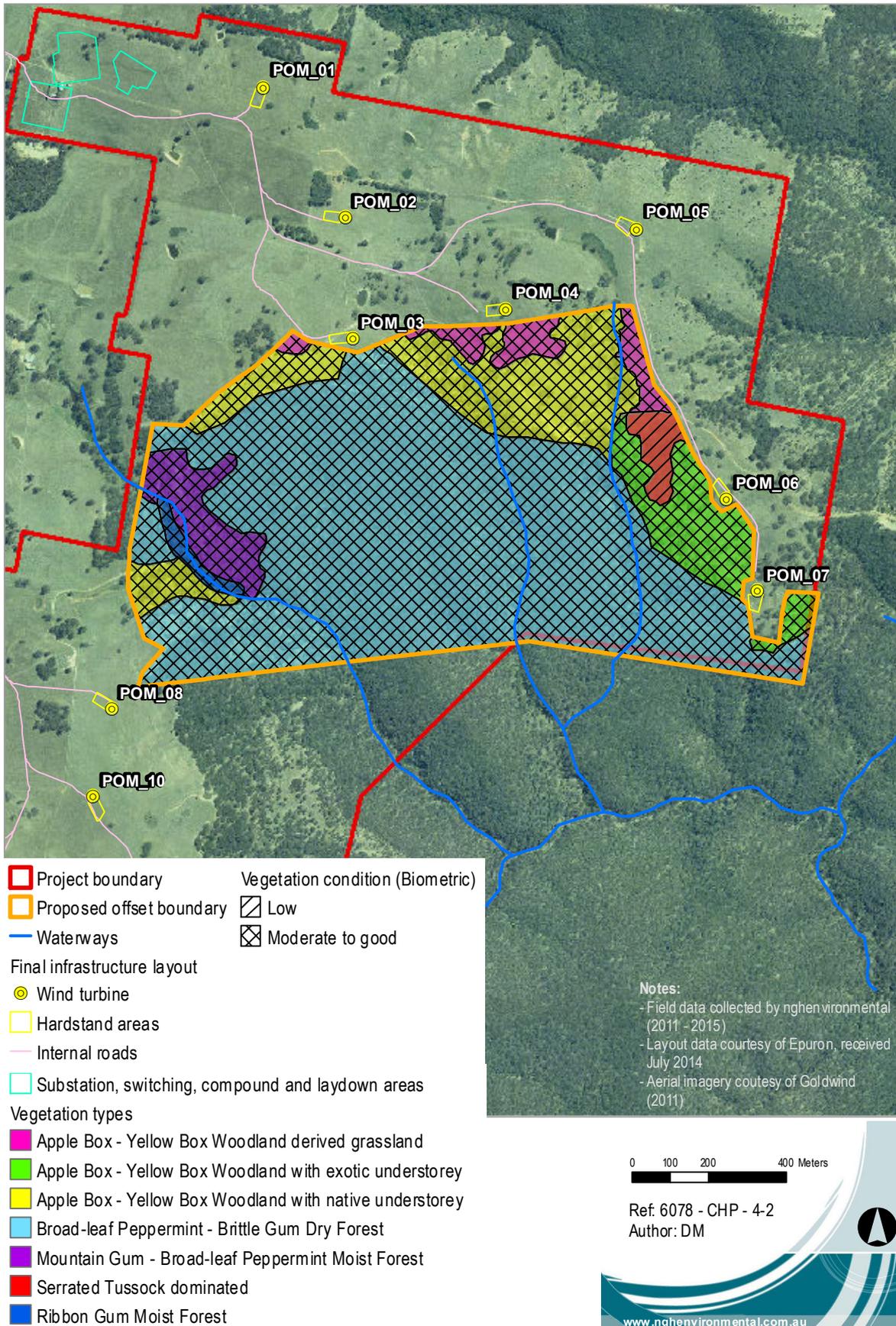


Figure 3-2 Vegetation types and condition within the proposed offset site

3.2.1 Vegetation communities to be offset

Apple Box – Yellow Box Woodland EEC and Derived Grassland

The Apple Box – Yellow Box Woodland within the offset site has been subject to varying levels of disturbance mostly due to past clearing and ongoing grazing. An overstorey comprised of Apple Box (*Eucalyptus bridgesiana*) and Yellow Box (*E. melliodora*) is present across the mapped area. In the section of the site west of the unnamed creek, active regeneration of the overstorey is occurring (Figure 3-3). The understorey is predominately comprised of native grasses such as *Poa* spp., Weeping Grass (*Microlaena stipoides*), Red-leg Grass (*Bothriochloa macra*) and Corkscrew Grass (*Austrostipa scabra* subsp. *falcata*) although native forb diversity is very low. The noxious weed, Serrated Tussock (*Nassella trichotoma*) is widespread in adjacent pastures and is present as scattered plants and localized denser patches throughout the western section. The vegetation in this area would be considered to be in moderate to good condition according to the Biometric condition classes both due to percent overstorey cover and the presence of a predominately native understorey.



Figure 3-3 Apple Box – Yellow Box Woodland and derived grassland in the west of the offset site with evidence of overstorey regeneration (right)

To the east of the unnamed creek, serrated tussock becomes more prevalent in the understorey and is dominant south of the existing track to the west of turbines POM_06 and POM_07 (refer to map in Figure 3-2 and Figure 3-4). There is no evidence of overstorey regeneration in this area and native grasses and forbs are largely absent. Approximately 9 hectares of the Apple Box – Yellow Box Woodland within the offset area has an understorey dominated by Serrated Tussock, however, given the amount of overstorey cover in the treed areas, it would still be considered to be in moderate to good condition according to the Biometric condition classes.



Figure 3-4 Serrated Tussock to the south of the existing track (left) and dominating the understorey west of POM_06 (right).

Some degree of forb diversity was evident in the area south of turbine POM_07 (Figure 3-5). Common species such as *Geranium solanderi*, *Acaena ovina* and *Viola betonicifolia* were present. Serrated Tussock was also prevalent in this area and native grasses largely absent during the 2014 survey however, this is considered likely to be a result of recent attempts to control the Serrated Tussock in the area in which it appeared that a broad application of a grass specific herbicide had been used.



Figure 3-5 Apple Box – Yellow Box Woodland south of POM_07.

An area of approximately 2.23 hectares of Apple Box – Yellow Box Woodland occurs in the south-west of the proposed offset site (Figure 3-6). Grazing pressure appears to be lower in this area and scattered regeneration of Yellow Box was observed. The understorey is variable dominated by Kangaroo Grass (*Themeda australis*) and Snow Grass (*Poa sieberiana* var. *sieberiana*) with a moderate diversity of native forbs including Native Dock (*Rumex brownii*), Kidney Weed (*Dichondra repens*), Sheeps Burr (*Acaena echinata*), Common Woodruff (*Asperula conferta*) and Raspwort (*Gonocarpus tetragynus*). Serrated tussock occurs in low densities within this area but its distribution is patchy and confined to areas where the overstorey is more open.



Figure 3-6 Apple Box – Yellow Box Woodland in the south-west of the proposed offset site.

The Apple Box – Yellow Box vegetation at the offset site meets the definition of the White Box - Yellow Box - Blakely’s Red Gum Woodland Endangered Ecological Community (EEC) listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act).

Broad-leaf Peppermint – Brittle Gum Forest

The majority of the Broad-leaf Peppermint – Brittle Gum Forest within the offset site is relatively undisturbed. A continuous canopy of Broad-leaf Peppermint (*Eucalyptus dives*) and Brittle Gum (*E. mannifera*) typical of this community is present over a predominately native midstorey and understorey. Serrated Tussock is present along the margins of the community where it borders the Apple Box – Yellow Box Woodland particularly in the eastern section of the offset site however, it did not appear to penetrate into areas where the canopy was continuous (Figure 3-7).

A mixed age class of trees is present however, mostly trees are younger regrowth. The Broad-leaf Peppermint – Brittle Gum Forest within the offset site would be considered to be in moderate to good condition according to the Biometric condition classes both due to percent overstorey cover and the presence of a predominately native understorey.

This community is not considered to comprise an EEC.



Figure 3-7 The Broad-leaf Peppermint – Brittle Gum Forest boundary within the offset site

Mountain Gum – Broad-leaf Peppermint Forest

This community occurs in the west of the proposed offset site (Figure 3-8). The overstorey is dominated by Mountain Gum (*Eucalyptus dalrympleana*) and Broad-leaf Peppermint with a variable component of Apple Box. Hickory Wattle (*Acacia falcata*) is a common small tree in the east of the community. Common shrubs include Sifton Bush (*Cassinia arcuata*), Urn Heath (*Melichrus urceolatus*) and Grey Guinea Flower (*Hibbertia obtusifolia*). A generally grassy groundcover is present dominated by species including Kangaroo Grass, Wallaby Grasses and Snow Grasses. A high diversity of native forbs is present.

Exotic species are generally sparse with occasional Cat's Ear (**Hypochaeris radicata*) and Common Centaury (**Centaureum erythraea*) most abundant. Sweet Vernal Grass (**Anthoxanthum odoratum*) is present in patches.



Figure 3-8 Mountain Gum – Broad-leaf Peppermint in the west of the proposed offset site

Serrated Tussock is generally absent from the area occupied by this community with the exception of a more open patch on an upper flat where Apple Box is the sole dominant species. Here, likely due to the more open canopy, Serrated Tussock dominates the groundcover (Figure 3-9) however, a good diversity of native forbs and shrubs still persists in the inter-tussock spaces.



Figure 3-9 Area within the Mountain Gum – Broad-leaf Peppermint community with a Serrated Tussock dominated understory.

The Mountain Gum – Broad-leaf Peppermint Forest within the offset site was largely comprised of younger regrowth with occasional more mature trees. It would be considered to be in moderate to good condition

according to the Biometric condition classes, due to the presence of a predominately native understorey and/or percent overstorey cover. The community appeared to be confined to areas containing underlying Basalt.

This community is considered to comprise the Tablelands Basalt Forest EEC listed under the TSC Act.

Ribbon Gum Forest

This community occurs along the unnamed drainage line in the south-west of the proposed offset site and occupies a stretch of approximately 350 metres where the adjacent slopes are relatively steep (Figure 3-10). The overstorey is dominated by Ribbon Gum (*Eucalyptus viminalis*) with *Acacia* spp. common as small trees. The shrub layer is largely comprised of *Cassinia* spp. with large patches of the noxious weed Blackberry (**Rubus fruticosus* sp. agg.) also present. The groundcover is largely dominated by Bracken Fern (*Pteridium esculentum*) with other common native species including Snow Grass, *Geranium solanderi*, Bidgee Widgee (*Acaena novae-zelandiae*), Prickly Starwort (*Stellaria pungens*), Maidenhair Fern (*Adiantum aethiopicum*) and Forest Hedgehog Grass (*Echinopogon ovatus*). Exotic groundcover species are also widespread and include common weed species such as Cocksfoot (**Dactylis glomerata*), Sheeps Burnett (*Sanguisorba minor*) and Cat' Ear.



Figure 3-10 Ribbon Gum Forest and dense areas of Blackberry within the proposed offset site

Large mature Ribbon Gum trees are common within the Ribbon Gum Forest. The vegetation would be considered to be in moderate to good condition according to the Biometric condition classes, due to percent overstorey cover. Percent native cover in the understorey is variable depending on the degree of invasion by exotic species.

This community could be considered to form part of the Tablelands Basalt Forest EEC listed under the TSC Act at the site.

3.3 SUITABILITY OF THE PROPOSED OFFSET SITE TO MEET THE OBJECTIVES

3.3.1 Offset ratios

A total of approximately 22.88 hectares of native vegetation has been permanently removed by the development of the wind farm. Approximately 122.93 hectares of native vegetation will be protected at the offset site resulting in a ratio of 5.4:1. This exceeds the 2:1 ratio required however, it does not completely satisfy the requirements of a “like for like” offset. Only three vegetation communities that will

be impacted occur within the offset site whereas five vegetation communities plus areas of native pasture will be permanently impacted by the development (refer Table 3-3 below).

Table 3-3 Areas by vegetation type impacted by the development and offset at the offset site

Vegetation type	Area impacted	Area offset	Ratio
Apple Box - Yellow Box Woodland (and derived grassland)	3.36	32.61	9.7
Broad-leaf Peppermint- Brittle Gum Forest	1.49	83.59	56.1
Mountain Gum-Broad-leaf Peppermint Forest	1.02	5.51	5.4
Narrow-leaf Peppermint Forest (and derived grassland)	4.27	0	0
Scribbly Gum-Brittle Gum-Broad-leaf Peppermint Forest	0.95	0	0
Ribbon Gum	0	1.22	NA
Native Pasture (not Apple Box – Yellow Box Woodland derived)	11.79	0	0
Total	22.88	122.93	5.4

The three native vegetation communities that are impacted by the development and represented within offset site have high offset ratios, 9.7 : 1 for Apple Box – Yellow Box Woodland, 5.4 : 1 for Mountain Gum – Broad-leaf Peppermint Forest and 56.1 : 1 for Broad-leaf Peppermint – Brittle Gum Forest, well exceeding the general 2:1 offset requirement. The vast majority of permanent impact to native vegetation occurred within native dominated (non-EEC derived) pasture which has little conservation value and does not occur within the offset site. Areas of forested vegetation (not including derived grassland) that were permanently removed only total 3.1 hectares. It is considered that the generous ratios of the communities within the offset site compensate for the small areas to be impacted in those communities that aren't contained within the offset site. Also, given the total area to be offset exceeds the 2:1 requirement of the total area to be impacted and that the majority of vegetation that has been impacted is of low conservation value (native pasture) the offset site is considered to satisfy the 2:1 offset ratio requirement.

3.3.2 Conservation values

Flora

The offset site contains approximately 28.13 hectares of Apple Box – Yellow Box Woodland and (4.48ha) derived grassland an EEC listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act). Compared to the relatively small amount (3.36 ha) of this community that has been permanently impacted by the proposal this represents a positive conservation outcome for this community. The area to be protected represents the largest occurrence of this community within the site boundary. The majority (19.21 ha) is in reasonable condition with an intact overstorey and mostly native understorey (although with a low forb diversity and scattered patches of exotics). By protecting this area and employing the management measures recommended in Section 4.5, the biodiversity values of this area will be enhanced.

It is acknowledged that approximately 11 hectares of the offset site is currently heavily infested with Serrated Tussock. Of this 11 hectares approximately 9 hectares has an Apple Box – Yellow Box overstorey of sufficient density to be considered the Box-Gum Woodland EEC in moderate to good condition according to the Biometric definitions. With intense management including ongoing weed control and re-vegetation

works, it is considered likely that over time this area can be rehabilitated resulting in the removal of a declared noxious weed and restoration of a mostly native understorey. Mature trees are present in this area and with appropriate management including the exclusion of grazing, it is likely that natural regeneration of the overstorey will occur. This could be assisted with plantings. Appropriate management measures specific to this area have been recommended in Section 4.5.

With the implementation of these measures over the long-term it is considered that a “maintain or improve” outcome for the Apple Box – Yellow Box Woodland EEC can be achieved.

Approximately 4.27 hectares of Narrow-leaf Peppermint Forest and derived grassland which is listed as Tablelands Basalt Forest under the TSC Act have been permanently removed by the development. The Narrow-leaf Peppermint vegetation type is not present within the offset site. The offset therefore fails to provide a “like for like” offset with regard to this vegetation type however, the Mountain Gum – Broad-leaf Peppermint Forest within the proposed offset site is considered to meet the definition of the Tablelands Basalt EEC as it occurs on Basalt, is of suitable structure, and contains species that are diagnostic of the EEC. The Ribbon Gum Forest within the offset site could also be considered to fall within the definition of the EEC. As such the offset is considered to provide a ‘like for like’ offset with regards to the Tablelands Basalt Forest EEC offsetting the impacts of the proposal at a ratio of 1.6 : 1.

It is acknowledged that a ratio of 2 : 1 is not met for Tablelands Basalt Forest EEC. However, a relatively large area of Apple Box – Yellow Box Woodland and derived grassland is to be conserved (32.61 hectares) in the offset site, compared to the total area (7.63 ha) of mostly degraded EEC (Box Gum Woodland and Tablelands Basalt Forest) to be permanently removed by the development (a 4.2 : 1 ratio). The Tablelands Basalt Forest EEC to be impacted is predominately comprised of actively grazed low diversity derived grasslands (4.27 ha) whereas a mature overstorey is present over the majority of the Box Gum Woodland and Tablelands Basalt Forest EEC within the offset site. With active management over time, the offset is considered likely to provide a ‘like for better’ conservation outcome. Further, the proposed offset site provides one consolidated area of vegetation which will minimise edge effects and maximise management outcomes. This also provides a ‘like for better’ outcome as areas to be impacted by the development are fragmented and vulnerable to further degradation.

Fauna

The habitat to be cleared represents small portions over a large area. Therefore it is difficult to compare directly the value of what would be lost to the value of what would be offset. The primary concern with clearing for the proposal is not the quantity of direct loss of habitat *per se*, but the impact such loss may have on landscape and habitat connectivity. Habitat connectivity affects the ability for fauna to utilise available habitat to the fullest extent and maintain viable populations. Therefore in considering the suitability of the proposed offset site, its’ role in connectivity and the strategic benefit of its conservation must be considered.

Within the context of surrounding forest, the proposed offset site would protect the extant connectivity between forest areas to the north, south and west. That is, it would maintain the existing biodiversity values. This linking habitat provides valuable stepping stones and a paddock tree matrix which allows fauna to move between forest areas. Long-term protection will aid foraging of sedentary species such as Powerful Owls and migration of nomadic and migratory species such as Scarlet Robins (*Petroica multicolor*).

With regard to the habitat value of the proposed offset site, the site does capture relatively diverse and good quality habitat for species such as robins and (potentially) threatened reptiles. Flame Robins (*Petroica phoenicea*) are known to utilise the open woodland, forest and grassland matrix and it is likely that Scarlet Robins would also utilise these habitats. Both are listed as vulnerable under the TSC Act. The Brown

Treecreeper (*Climacteris picumnus victoriae*) is also listed as Vulnerable under the TSC Act and is known to occur within the offset site. Conservation of this habitat in perpetuity would assist these and other potentially occurring threatened species with small home ranges, such as Varied Sittella (*Daphoenositta chrysoptera*).

For wide-ranging fauna species such as Powerful Owl and Little Eagle (both listed as Vulnerable under the TSC Act), Wedge-tailed Eagle, Wallaroo and others, the conservation of around 120 hectares of woodland will make little difference to long-term population viability. The proposed offset site does not capture the most diverse fauna habitat with the highest ecological integrity but fortunately, no such patch would be affected by the proposal. The offset site does however, protect a known nesting site attributed to the Little Eagle² and provides a managed buffer between the development and agricultural lands and known nesting and roosting habitat for the Powerful Owl. Long-term management of the offset site will provide flow on benefits for the Powerful Owl by limiting potential encroachment on important habitat (from either direct or indirect impacts) and reducing impacts from feral species which in turn may promote healthier populations of prey species.

Overall, conservation of any continuous area of forest or woodland in an agricultural setting is an improved outcome for biodiversity values. In many threatened species recovery plans, threat abatement strategies and priority actions identified by OEH, off-reserve conservation is a key tool for long-term biodiversity conservation.

3.3.3 Suitability of the offset site: summary

The proposed offset site has been selected based on its ability to provide biodiversity outcomes that meet the requirements of the approval conditions for the project. Its suitability is demonstrated above.

The proposed offset site provides good conservation outcomes in terms of providing and protecting habitat for species and communities of conservation significance and protecting a valuable habitat link in a highly fragmented landscape. The overall offset ratio of 5.4 : 1 exceeds the required 2:1 ratio and although a 'like for like' offset is not fully achieved for some vegetation types, the site is considered to provide a 'like for better' offset for communities and species of conservation significance. This is due to the large areas of EEC and continuous forest/woodland habitat (providing known threatened species habitat) to be protected, in comparison to the values of the areas being impacted which are primarily pasture (native and exotic) with low conservation significance.

There are areas of the proposed offset site that would benefit from long-term management and it is considered likely that the condition of these disturbed and degraded areas can be improved over time increasing the biodiversity value of the site in the long-term. Along with these areas, the areas that already contain high biodiversity values will be protected in perpetuity.

3.4 SECURING THE SITE IN PERPETUITY

A formal vehicle is required to secure the offset site in perpetuity and allow for the ongoing management of the offset site (including how the designated management actions will be funded). Four options were considered for securing a long-term management arrangement at the offset site:

² The nest was identified as that of Little Eagle by John Young in 2011. The species has not been sighted utilising the nest.

-
1. Biobanking agreement
 2. Conservation Property Vegetation Plan (CPVP)
 3. Local Environmental Plan: Environmental Zone
 4. Plan of management with S.88b covenant

The benefits of each of these options were assessed. Based on the duration and security of the agreement (in perpetuity and attached to title) and the relative simplicity of establishment, a CPVP was decided upon as the vehicle to secure the offset site.

The local Catchment Management Authority has been previously contacted to set up a Conservation Property Vegetation Plan (CPVP) for the site. The CPVP would:

- Stipulate land title details and management zones (see section 3.5)
- Stipulate the management actions, for each zone, that must be carried out to improve the site.
- Disallow any activities that adversely impact on the objective of the site which is to improve biodiversity values.

The CPVP will be a legally binding agreement under both the Native Vegetation Act 2003 and the Threatened Species Conservation Act 1995. To ensure that the CPVP is binding on successors in title, an abstract of the CPVP will be registered with the NSW Office of Land and Property Information under the *Real Property Act 1900*. The terms of the CPVP will not be affected by any changes to local or state planning rules or new listings of threatened species. A CPVP can be varied at the landholder's request, provided the variation will still improve or maintain environmental outcomes.

The offset site and the property on which it is located are both owned by New Gullen Range Wind Farm Pty Ltd. The CPVP's management prescriptions will affect only the offset site (delineated in orange on Figure 4-1).

As the CPVP is attached to the land title, the land owners are ultimately responsible for funding the management actions required at the offset site and monitoring the effectiveness of their implementation. The CPVP will include management actions associated with the offset site that will apply in perpetuity. These management actions will be applied in consultation with the Office of Environment and Heritage and be consistent with recommendations as detailed in Section 3.5. Funds would be made available by New Gullen Range Wind Farm Pty Ltd to implement management measures as the owners of the land.

3.5 SUGGESTED MANAGEMENT MEASURES

The offset site contains different vegetation types and areas that has been subject to varying levels of disturbance. As such it is recommended that the site be divided into five separate management zones which will allow management measures to be targeted to the characteristics of each zone. These zones are described in Table 3-4 and shown on Figure 3-11.

Table 3-4 Proposed management zones within the offset site

Management Zone	Description
Zone 1	Apple Box – Yellow Box Woodland with a predominately low diversity native understorey and evidence of overstorey regeneration. The area has been previously thinned for grazing. Serrated Tussock occurs in patches and as scattered individuals throughout the zone.
Zone 2	Apple Box – Yellow Box Woodland with a predominately exotic understorey dominated by Serrated Tussock. There is no evidence of overstorey regeneration. The area has been previously thinned for grazing.
Zone 3	Predominately regrowth Broad-leaved Peppermint – Brittle Gum Dry Forest and Mountain Gum – broad-leaf Peppermint Forest with a relatively intact diverse native understorey. Serrated Tussock occurs at the boundary of the Broad-leaved Peppermint – Brittle Gum Dry Forest and the Apple Box – Yellow Box Woodland but does not penetrate into areas with a dense overstorey.
Zone 4	Ribbon Gum Forest with a mixed native and exotic understorey. Blackberry is extensive in this area.
Zone 5	Localised Apple Box dominated area where an more open canopy has facilitated the invasion of Serrated Tussock

The overall objective in managing the offset site is to ‘maintain or improve’ its condition – no loss of value. It is recommended that a detailed CPVP be prepared in consultation with OEH to identify appropriate measures, which will enable the objective of ‘maintain or improve’ to be measured, quantified and verified.

The plan should outline:

- a. The objectives of the offset land, in particular the objectives of the management regime to be implemented on the land
- b. Management response actions associated with particular scenarios, such as fire damage, pest control, unexpected weed invasion, vandalism etc.
- c. Details of how the management measures address the objectives, and details of any monitoring that is required to measure the success or otherwise of the management plan. A key measure would be to undertake a detailed survey of the proposed conservation area, following endorsement of the CPVP and prior to the implementation of the management plan, to provide a benchmark for determining whether the objective of ‘maintain or improve’ is being achieved, relative to the those management measures/actions identified in the plan.

A range of management strategies could be taken to managing the offset site. A set of management actions appropriate to the proposed offset site have been formulated below considering:

- The conditions of approval for the project.
- Existing biodiversity threats identified onsite.
- Specific threats identified in recovery plans for relevant threatened entity listings.
- The OEH *Principles for the use of biodiversity offsets in NSW*.
- Indicated concerns of OEH as set out in the recommended conditions of approval.

The following table sets out the aim of each measure, the management zones in which it applies, the rationale for undertaking it at the site and an auditable measure of its implementation. Recommended methods for monitoring the success of management measures with respect to achieving a ‘maintain or improve’ objective are also included.

Appendix B takes the recommended management actions for the offset site and provides them as a series of practical actions, able to be audited and adapted in response to what is observed at the offset site. The plan is formatted as a **quarterly checklist** and **annual review** so that a record of actions and useful notes on their effectiveness can be retained.

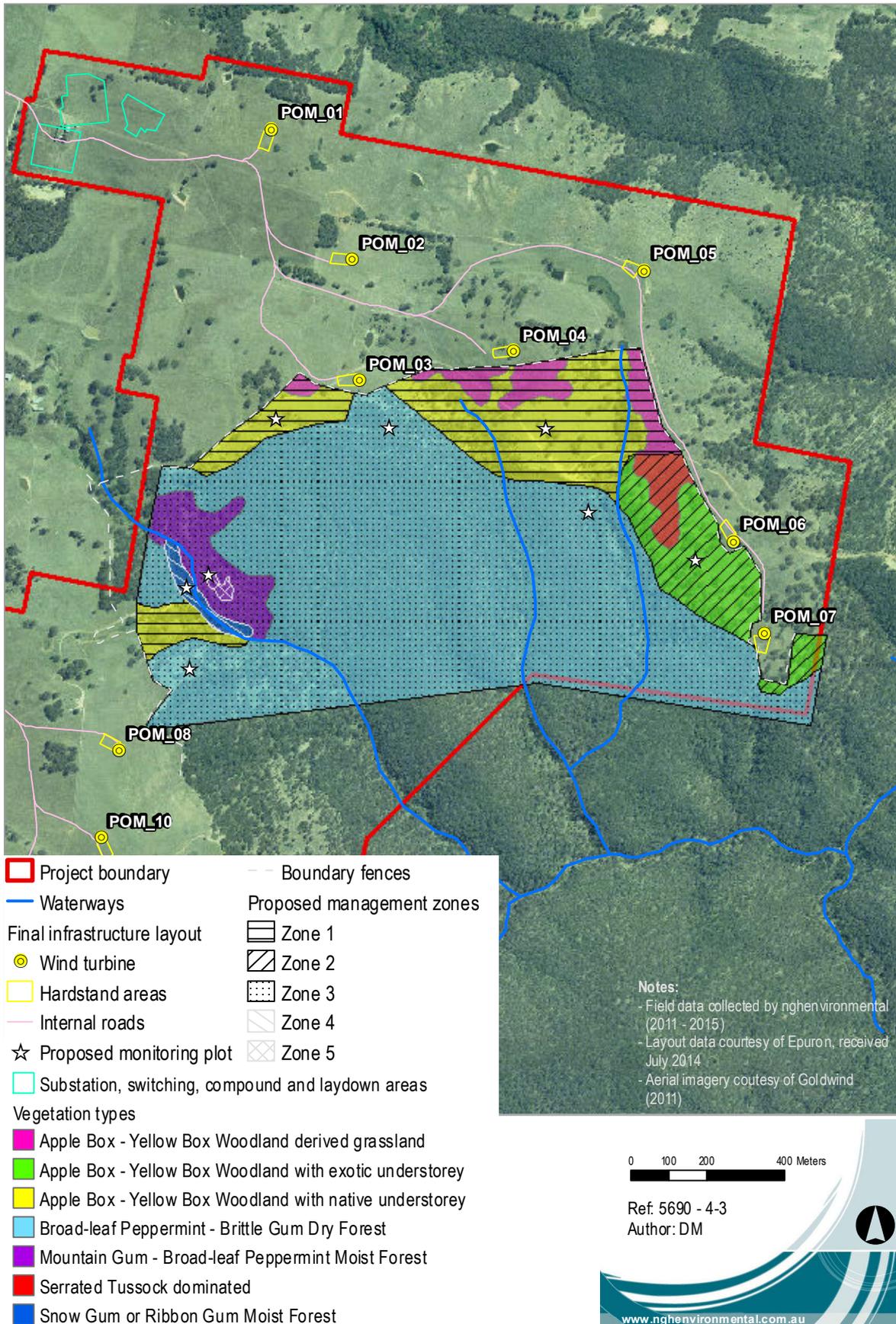


Figure 3-11 Proposed management zones and monitoring plot locations within the offset site

Table 3-5 Management measures required for the offset site

Aim	Rationale	Applicable management zones	Auditable measure
AT ESTABLISHMENT OF OFFSET SITE			
Develop a detailed management plan to guide and record management actions.	This will be required to clearly set out actions, guide their implementation (including co-coordinating with land holders where required) and should be used as working document to record actions undertaken and any issues that could be modified. This will be in the form of a CPVP.	Zone 1, 2, 3, 4 and 5	Completed and registered CPVP (the measures below can be documented within this plan).
Encourage existing actions that are leading to improvement of the areas.	The majority of the proposed offset site consists of intact woody vegetation. Although there are breaches in fencing, it is likely this area has not been subject to high grazing pressure. The ongoing prevention of grazing in this area is recommended. Fencing of the entire offset area is not recommended due to the potential to fragment an existing intact forest remnant. To achieve the aim of stock exclusion, fencing is only considered to be necessary where the offset site adjoins cleared pastures. Within the forest vegetation, survey pegs would be located sufficient to visually identify the boundary.	Zone 1, 2, 3, 4 and 5	Stock-proof fencing of the offset site installed and maintained for the areas as shown in Figure 3-11.
Establish baseline vegetation and habitat condition data	To demonstrate that a “maintain or improve” objective is being achieved at the offset site, it is necessary to collect data which categorises the condition of the offset prior to establishment. It is recommended that a repeatable method of data collection that provides quantifiable data be used such as Biometric plots. This would involve the establishment of permanently marked transects and quadrats within each management zone. The data collected would enable the calculation of a site value score which, along with the data collected for each individual variable, can be compared to benchmark data held by the OEH for the relevant vegetation type and could easily be compared across years. It is suggested that at least two plots be established in Zone 1, three plots in Zone 3 and one plot each in Zone 3, 4 and 5 as indicated on Figure 3-11.	Zone 1, 2, 3, 4 and 5	Permanently marked Biometric plots established. Baseline data collected prior to the implementation of management actions.

Aim	Rationale	Applicable management zones	Auditable measure
ONGOING GENERAL MANAGEMENT MEASURES			
Target identified threats to biodiversity:			
<ul style="list-style-type: none"> Invasion by exotic perennial grass 	<p>The majority of the areas targeted for offset have not been ‘improved’ or intensely managed. Other potential areas have been subject to high levels of disturbance. Weed monitoring and eradication (particularly targeting exotic perennial grasses and noxious weeds) would be undertaken within and on the periphery of the site with the aim of reducing weed abundance on the offset site and protecting it from invasion from adjacent sites.</p> <p>A Weed Management Plan would be prepared for the offset site in consultation with the land owner and qualified weed control personnel (e.g. Local council or NSW Local Land Services) Control measures implemented would be targeted and would not include broad acre applications of herbicide such as boom or aerial spraying. Suitable measures would include:</p> <ul style="list-style-type: none"> Spot spraying target species using a hand held device Physical removal by hand Any other methods recommended by a weed control expert and agreed in consultation with OEH 	Zone 1, 2, 3, 4 and 5	<p>Weed Management Plan incorporating suitable measures prepared and implemented.</p> <p>Weed monitoring completed seasonally.</p> <p>Weed treatments consistent with Weed Control Plan. Quantity of chemical and location of action to be recorded.</p> <p>Annual report to provide map of extent of current and past weed infestation, details of control undertaken and an assessment of the success of current management.</p>
<ul style="list-style-type: none"> Pest animal control 	<p>Foxes, rabbits, hares, goats and deer are likely to be established within or near the offset site (NGH Environmental 2008). A Feral Animal Control plan would be prepared in consultation with the landowner and landowners of adjacent properties and qualified feral animal control personnel (e.g. Local council or NSW Local Land Services). The plan would clearly outline the types of control and when the feral animal control will occur. Baiting for rabbits and hares would not be allowed as a control measure as this has the potential to negatively impact on foraging Little Eagles.</p>	Zone 1, 2, 3, 4 and 5	<p>Feral Animal Control Plan prepared and implemented.</p> <p>Correspondence with adjacent landowners documented.</p> <p>Control measures and their location recorded.</p>
<ul style="list-style-type: none"> Removal of fallen timber 	<p>Fallen timber would be left in place within the offset site.</p>	Zone 1, 2, 3, 4 and 5	<p>Annual audit of performance.</p>

Aim	Rationale	Applicable management zones	Auditable measure
<ul style="list-style-type: none"> Installations to offset removed hollow-bearing trees 	<p>Sections of felled trees containing hollows or nest boxes to emulate hollow-bearing trees would be mounted within the offset site to preserve the overall abundance of hollows across the project boundaries. That is, for each hollow removed by the proposal, one hollow would be mounted or nest box constructed in the offset area. Mounted hollows or nest boxes would not be placed within 200m of turbines.</p>	<p>Zone 1, 2, 3, 4 and 5</p>	<p>Documentation of the number of nest boxes installed compared to number of hollows removed.</p> <p>One-off audit, once installed. Annual audit to confirm still in place.</p>
SPECIFIC MANAGEMENT MEASURES			
<p>Rapid control of Serrated Tussock</p>	<p>Serrated Tussock is widespread within more open areas of the offsite site and within the adjacent development site. This noxious weed species threatens the integrity of the native dominated groundcover in Zone 1 and has already come to dominate the groundcover in Zone 2. The weed management plan would include specific actions focusing on the rapid control of Serrated tussock and other noxious weeds in Zones 1 and 2. The plan would include follow up works to establish native grass species in areas where Serrated Tussock is dominant.</p>	<p>Zone 1, 2 and 5. Follow up works in Zone 2 and 5.</p>	<p>Weed management plan prepared and implemented.</p> <p>Reduced extent of Serrated Tussock.</p>
<p>Rapid control of Blackberry</p>	<p>Blackberry is extensive within the Ribbon Gum Forest which occupies the unnamed drainage line in the west of the offset site. The weed management plan would include specific actions focusing on the rapid control of Blackberry and other noxious weeds in Zone 4. The plan would include follow up works to prevent the re-establishment of Blackberry in this area.</p>	<p>Zone 4</p>	<p>Weed management plan prepared and implemented.</p> <p>Reduced extent of Blackberry</p>

Aim	Rationale	Applicable management zones	Auditable measure
<p>Assisted regeneration of overstorey and midstorey vegetation</p>	<p>Overstorey regeneration is occurring in Zone 1 but not in Zone 2 where Serrated Tussock is prevalent. The establishment of overstorey and midstorey vegetation would not only assist in the recovery of the community in this area but would also help to control the re-establishment of Serrated Tussock following control works. Plantings would aim to increase the tree density to at least 25 (or an on-site determined benchmark tree/shrub density) trees and shrubs per hectare and consist of the species present within the surrounding Apple Box – Yellow Box Woodland. Plants used for planting must be obtained from locally collected provenances.</p> <p>Plantings would be monitored, maintained and replaced if necessary for the first 3 years after planting or until plants are at least 2 metres in height.</p> <p>The planting program would aim to have the overstorey and midstorey vegetation cover within benchmark for Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands in the Hawkesbury Nepean CMA within 5 years after CPVP is registered and active management has commenced.</p> <p>Planting of overstorey trees would not be undertaken within 100m of turbines so as not to further encourage roosting/nesting of bird and bat species in close proximity to turbines.</p>	<p>Zone 2</p>	<p>Plantings established and maintained.</p> <p>Planting density at least 25 plants per hectare (or at other predetermined benchmark).</p> <p>Proportion of planted vegetation >2m high.</p> <p>Overstorey and midstorey vegetation cover within or approaching benchmark within 5 years after CPVP is registered and active management has commenced.</p>
<p>Enrichment of native ground cover and species diversity</p>	<p>Native groundcover diversity is generally low across Zones 1 and 2. Where weed species such as serrated tussock have become prevalent, the percent cover of native species is also low. Increasing the percent cover and diversity of native groundcovers would assist in restoring ecosystem function within these zones.</p> <p>Native seed containing local province grass, forb and shrub species would be broadcast in late winter/early spring for the first three years or until monitoring indicates that native groundcover and diversity has sufficiently increased. Seed would be broadcast at a rate of between 2 - 6kg/ha depending on the weed load (higher in weedier areas) or as determined in consultation with an expert in revegetation.</p> <p>The seeding program would aim to have the native ground cover vegetation cover within benchmark for Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands in the Hawkesbury Nepean CMA within 5 years after the CPVP is registered and active management has commenced.</p>	<p>Zone 1, 2 and 5</p>	<p>Seeding conducted late winter/early spring.</p> <p>Groundcover vegetation within or approaching benchmark within 5 years after the CPVP is registered and active management has commenced.</p>

Aim	Rationale	Applicable management zones	Auditable measure
Exclusion of grazing	<p>Given that overstorey regeneration is occurring in Zone 1, plantings will be established in Zone 2 and that stock provide a vector for the spread of weeds such as Serrated Tussock, it is recommended that grazing be excluded from all areas within the offset site unless agreed upon in consultation with OEH and with the approval of the Secretary.</p> <p>It is acknowledged that there are farm dams within the offset area that currently provide water for stock. A simple solar pump and overland poly pipe system is recommended to allow for the transportation of this water out of the offset area to other appropriate stock watering points in existing pasture areas. This would remove the need for stock to enter the offset site for access to water.</p>	Zone 1, 2, 3, 4 and 5	<p>No evidence of grazing within the offset area.</p> <p>Solar pump system for any water transportation installed, if required.</p>
MONITORING AND REPORTING			
To undertake surveys to assess performance against baseline data and management objectives.	<p>Following the collection of baseline data, monitoring plot data would be then collected annually (up to a maximum of 20 years) as management actions are implemented. Comparing the data to the baseline (and to previous years when applicable) and the bench mark data held by OEH would allow improvements in condition to be demonstrated with the goal of reaching bench mark condition within 5 years after CPVP is registered and active management has commenced) . The data would also be utilised to inform the adaptive management of the site.</p> <p>In addition to the monitoring plot data, quarterly site inspections and an annual review of management performance would be undertaken as outlined in Appendix B.</p>	Zone 1, 2, 3, 4 and 5	<p>Ongoing monitoring completed annually (up to a maximum of 20 years).</p> <p>Quarterly site inspections and annual management performance review completed.</p>

Aim	Rationale	Applicable management zones	Auditable measure
REVIEW AND ADAPTIVE MANAGEMENT			
<p>Be adaptive to the results obtained during monitoring.</p>	<p>All actions above would be assessed in an annual report aiming to document:</p> <ul style="list-style-type: none"> • Details of all actions undertaken throughout the year. • Any change in condition, observed through monitoring. • Recommendations for alterations to management. <p>The information could be collected by the land manager and reviewed by the Goldwind Australia Representative as part of the OEMP, who in consultation with relevant specialists would assess the yearly report and revise management prescriptions as required to achieve improvement at the site.</p> <p>This report can be used to review the effectiveness of actions in consultation with the land manager.</p>	<p>Zone 1, 2, 3, 4 and 5</p>	<p>Annual report, provided to Dept. Planning and Wind Farm Developer.</p> <p>Management adapted as recommended in the annual report.</p>

4 CONCLUSION

This revised CHP has been prepared to satisfy the proponent's obligations under Approval Condition 2.35 and their commitment to offset vegetation removed according to SoC 16 & 16a of the Environmental Assessment for the project. The OEH document *Principles for the use of Biodiversity Offsets in NSW* (see Appendix A) has been used to guide the preparation of this package.

The proposed offset site is considered suitable to offset the validated permanent biodiversity impacts from the Gullen Range Wind Farm. The overall offset ratio of 5.4:1 exceeds the required 2:1 ratio. It is considered that a 'like for better' offset is provided given the large areas of EEC and threatened species habitat to be protected and the provision of landscape connectivity that the proposed offset site provides. Management strategies have been provided within this package that will 'maintain or improve' the biodiversity values of the proposed offset site for the long-term.

A CPVP will be established in perpetuity to ensure the long-term management of the site. The implementation of a monitoring program to inform adaptive management will ensure that a 'maintain or improve' outcome for the project is achieved.

5 REFERENCES

Department of Environment and Climate Change (DECC) (2008) BioMetric 2.0 A Terrestrial Biodiversity Assessment Tool for the NSW Native Vegetation Assessment Tool Operational Manual, July 2008.

NGH Environmental (2008a) Environmental Assessment: Proposed Wind Farm, Gullen Range NSW.

NGH Environmental (2008b) Proposed development the Gullen Range wind farm, southern tablelands of New South Wales: Biodiversity Assessment.

Office of Environment and Heritage, Principles for the use of biodiversity offsets in NSW, (<http://www.environment.nsw.gov.au/biocertification/offsets.htm> accessed 2.9.11)

Appendix A Principles for the use of biodiversity offsets in NSW

This offset strategy has been guided by the OEH Principles for the Use of Biodiversity Offsets in NSW, as detailed below.

1 Impacts must be avoided first by using prevention and mitigation measures.

Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

By way of iterative infrastructure planning, considering refined constraints mapping, the proposal has avoided and mitigated, proposing to offset only residual impacts. This is documented within the BA (NGH Environmental 2008).

2 All regulatory requirements must be met.

Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).

Not relevant to this proposal.

3 Offsets must never reward ongoing poor performance.

Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.

The offset site will be set up in perpetuity – this removes the incentive to degrade the offset site to facilitate development at a later date

4 Offsets will complement other government programs.

A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.

As a private conservation area, this offset site would complement existing reserves.

5 Offsets must be underpinned by sound ecological principles.

They must:

- *include the consideration of structure, function and compositional elements of biodiversity, including threatened species*
- *enhance biodiversity at a range of scales*
- *consider the conservation status of ecological communities*
- *ensure the long-term viability and functionality of biodiversity.*

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

This plan provides a comprehensive evaluation of the value of the areas to be impacted and an assessment of suitable offset areas at the site (refer to Section 3) and demonstrates the ability to achieve a like for better outcome. The offset site includes large areas with intact ecosystem functionality and relatively low disturbance. Management measures are recommended in this plan to actively improve areas that are more highly disturbed. Established, mature overstorey vegetation is present in the disturbed areas (that are invaded by Serrated Tussock) which provides a basis for rehabilitation. It includes vegetation of conservation significance and provides connectivity benefits at the landscape scale. The offset site establishes an area that will help to ensure the long-term viability and functionality of biodiversity at the site by ensuring its management and protection in perpetuity.

6 Offsets should aim to result in a net improvement in biodiversity over time.

Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.

Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.

Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.

This plan:

- Identifies threats to the proposed offset site
- Sets out suitable management measures that can be undertaken for the long-term
- Includes enhancement options, where required

7 Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs.

As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.

Consent Condition 2.35 and Statement of Commitment 16 state that offsets will be in perpetuity. As discussed in Section 3.4 of this document, a CPVP would be established on the title of the land and is therefore in perpetuity. The CPVP will be a legally binding agreement under both the Native Vegetation Act 2003 and the Threatened Species Conservation Act 1995. To ensure that the CPVP is binding on successors in title, an abstract of the CPVP will be registered with the Land and Property Management

Authority under the *Real Property Act 1900*. The terms of the CPVP will not be affected by any changes to local or state planning rules or new listings of threatened species.

8 Offsets should be agreed prior to the impact occurring.

Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.

Previous iterations of this plan were endorsed by the OEH prior to the commencement of works. Subsequent modifications have resulted in an increase in the size of the offset area and the inclusion of more intense management which will further contribute to the long-term protection of biodiversity values at the site.

9 Offsets must be quantifiable - the impacts and benefits must be reliably estimated.

Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:

- *the area of impact*
- *the types of ecological communities and habitat/species affected*
- *connectivity with other areas of habitat/corridors*
- *the condition of habitat*
- *the conservation status and/or scarcity/rarity of ecological communities*
- *management actions*
- *level of security afforded to the offset site.*

These points have been addressed in the calculation of impact areas and the management measures and security vehicles discussed in this document.

The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:

- *they protect land with high conservation significance*
- *management actions have greater benefits for biodiversity*
- *the offset areas are not isolated or fragmented*
- *the management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).*

In defining suitable offset areas, all points have been considered.

Management actions must be deliverable and enforceable.

This Compensatory Habitat Package provides the strategy for calculating, securing and managing the offset site. The overall objective is to 'maintain or improve' its condition – no loss of value. The actions to follow this strategy include securing the land under a CPVP, finalising a management plan to set out the timing of management actions and carrying out those actions, in accordance with this strategy.

10 Offsets must be targeted.

They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.

Offsets are proposed based on biodiversity values present in the context of the surrounding area and are considered likely to achieve a like for like or like for better outcome in the long-term.

11 Offsets must be located appropriately.

Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.

The offset site is located immediately adjacent to the areas that are to be impacted. Section 3 of this report demonstrates the similarity of the values between these areas.

12 Offsets must be supplementary.

They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.

The potential offset areas are currently privately owned and used for agricultural grazing activities. They are not funded under another scheme, protected or managed by the government. Management actions would retain private ownership.

13 Offsets and their actions must be enforceable through development consent conditions, license conditions, conservation agreements or a contract.

Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.

A covenant is proposed to be attached to the title of the offset site, to ensure no adverse activities are undertaken.

Management measures within this plan recommend yearly monitoring and reporting as part of the OEMP. Auditable measures have been provided.

Appendix B Adaptive management plan

The following plan has taken the recommended management actions for the offset site and turned them into a series of practical actions, able to be audited and adapted in response to what is observed at the offset site. The plan is formatted as a **quarterly checklist** and **annual review** so that a record of actions and useful notes on their effectiveness can be retained. **A separate quarterly checklist and annual review should be completed for each management zone.**

Offset site management protocols:

Once off:

1. Quantify the number and size of hollows removed during the wind farm construction phase.
2. Install an equivalent number and size of hollows within the offset site at least 200m from turbines.
3. Conduct intense control of Serrated Tussock using suitable methods that do not inhibit the reestablishment of native vegetation.
4. Conduct plantings to initiate regeneration (no planting of overstorey vegetation within 100m of turbines).

Ongoing:

5. Undertake quarterly site inspection.
6. Undertake management actions where required including:
 - a. Ongoing weed and pest control
 - b. Maintenance of fences
 - c. Maintenance of plantings
7. Record observations, management actions and their effectiveness on quarterly checklist form below.
8. Provide an annual review of management performance including:
 - a. Effectiveness of weed control
 - b. Effectiveness of feral animal control
 - c. Establishment of native vegetation
 - d. Maintenance of native vegetation
 - e. Incidences of erosion and sedimentation and effectiveness of any remedial action
 - f. Incidences of bushfire

The annual review would be included with the annual offset site management report which would include the results of monitoring and identify any need to modify the management action program.

9. Provide annual offset site management report to the Department of Planning and Environment, with the wind farms Annual Environmental Management Report.

Quarterly management checklist

Zone: _____ Date of site inspection: _____ Person undertaking inspection: _____

Issue	Action	Comments
Habitat values	Is timber being left where it falls?	
	Has timber collection been restricted?	
	Have the required number of nest boxes been installed?	
Grazing management	Are stock being excluded from the offset site?	
	Has fencing been installed as detailed on Figure 4-7 of the CHP?	
	Do fences need repair?	

Issue	Action		Comments	
Pest animal control	Is there evidence of foxes, rabbits, hares, goats, deer or pigs within the zone?			
	Has consultation been undertaken with adjacent landholders?			
	List the pest animals present in the offset site, below			
<i>Name of pest (abundance score⁴)</i>	<i>Location (include a map and append to checklist)</i>	<i>Evidence of activity</i>	<i>Proposed action (including date)</i>	<i>Provide date when action was undertaken</i>
<i>Example: Foxes</i>		<i>Seen taking refuge in dense regrowth</i>	<i>Talk to landholders and bait with 1080 (November)</i>	<i>Carried out November 12 and 13, 2011</i>

⁴ 1 = little evidence of activity, 2 = some evidence of activity, 3 = damage to vegetation or soil evident, 4 = extensive damage evident

Issue	Action	Comments		
Maintenance plantings	of Have plants had sufficient water to maintain growth? Any need to supplement?			
	Is there any evidence of death, damage or disease?			
	Are tree guards or other methods of protection intact and adequate?			
	List areas where follow-up maintenance of plantings is required below			
<i>Location (include a map and append to checklist)</i>	<i>Plants dead, stressed being browsed etc.?</i>	<i>Plant species needing replacement (if required)</i>	<i>Proposed action (including date)</i>	<i>Provide date when action was undertaken</i>

Issue	Action	Comments
Summary	What seasonal changes are evident?	
	Do any actions need to be undertaken in the next month?	
	Do any changes need to be made to this checklist or to management actions?	

Annual review

Zone: _____ Date of site inspection: _____ Person undertaking inspection: _____

Review question	Comment
Were all quarterly inspections undertaken?	
Should the frequency be altered?	
Has annual monitoring at established BioMetric plots been completed?	
Have all nest boxes been installed. Are they in need of repair?	
Is there any evidence of bushfire?	

Review question	Comment
<p>What positive trends are evident?</p> <p><i>For example, is habitat complexity increasing (timber on ground, good understorey cover, good regeneration, hollows and canopy vegetation retained)</i></p>	
<p>What negative trends are evident?</p> <p><i>For example, are weeds and pest animal activity increasing? Is there any evidence of erosion or sedimentation requiring action?</i></p>	

Review question	Comment
What changes will be made to the management actions to improve biodiversity outcomes?	

Appendix C Author qualifications and experience

Brooke Marshall

Qualifications

B. Natural Resources (Hons1)

Brooke provided technical input and senior review for this project. Brooke is Certified Environmental Practitioner (CEnvP) and manages the project work undertaken by the Bega office of NGH Environmental. Brooke also undertakes project work and has increasingly focused on large-scale infrastructure environmental assessment and management and strategic biodiversity assessment. She has prepared several wind farm environmental assessments, co-coordinating the preparation and incorporation of specialist reports to the Department of Planning. She has prepared referrals under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999*. Brooke is also an accredited Biobanking assessor and has undertaken Biobanking assessments and prepared offset plans, under this scheme in NSW.

Dave Maynard

Qualifications

B. Science (Ecology; Hons1)

Dave was the lead botanist, lead author and the GIS Officer for this project. Dave is part of NGH Environmental's biodiversity team and specialises in flora assessment. Dave has been involved in a range of projects including constraint and biodiversity impact assessment for major solar and wind farm projects. Dave has conducted botanical surveys within several biogeographic areas of NSW including the south-east coast, tablelands, alpine areas and north-western plains. He has experience in floristic survey planning and design and he has conducted numerous targeted surveys for threatened flora species listed under state and federal legislation in a wide range of habitats.

Jackie Miles

Qualifications

B. Science (Hons)

Jackie was the senior botanist in the field for this project. Jackie is a senior botanist and has worked on a number of large assignments including botanical surveys for the Comprehensive Regional Assessment which included full CRA floristic field validation for the Department of Environment and Climate Change (formerly NPWS). She also assisted in the preparation of the Vegetation Map for South East Forests National Park, botanical surveys for mapping of all NSW ski resort areas (for Planning NSW), surveys of significant remnant grassy vegetation for Bega Valley Shire Council, and a large number of botanical and fauna assessments for minor and major development proposals. This includes vegetation mapping and condition assessment for a number of wind farm projects.

Bianca Heinze

Qualifications

B. Applied Science (ERM/Coastal Mgt)

Bianca was the lead fauna ecologist for this project and assisted in mapping and review of the report. Bianca is part of NGH Environmental's biodiversity team, specialising in fauna assessment. Bianca has been involved in complex infrastructure projects in a range of biogeographic areas, including wind farms, highway realignments and power transmission alignments in New South Wales, South Australia and Western Australia. Bianca has been involved with surveys for marine and terrestrial mammals, birds, reptiles and microbats, including fauna survey and operational bird and bat monitoring for numerous wind farms.