Kaban Green Power Hub - Offset Area Management Plan

Neoen Australia c/o AECOM Australia Pty Ltd
Kaban Green Power Hub

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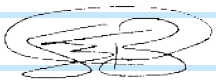
5	10/05/2021	Issued for use	Chays Ogston	Scott Baker	

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Definitions

Term	Definition
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat may include breeding, foraging and shelter resources for fauna
Offset area	The area which will be legally secured as an offset within: • Lot 1 RP735194 • Lot 2 RP735194; and • Lot 32 CWL254.
The project	Kaban Green Power Hub
Project site	The area assessed as part of the project's ecological assessments undertaken as part of the projects EPBC Act referral. This includes sections within: • Lot 1 RP735194 • Lot 2 RP735194 • Lot 33 CWL374 • Lot 34 CWL374; and • Lot 35 CWL391.

Abbreviations

Abbreviation	Description
DAWE	Commonwealth Government Department of Agriculture, Water and the Environment
DEE	Commonwealth Government Department of the Environment and Energy
E	Endangered
E2M	E2M Pty Ltd
EO Act	*Environmental Offsets Act 2014* (QLD)
EOP	EPBC Act Environmental Offsets Policy (Cth)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ha	Hectare
LC	Least Concern
MNES	Matter of National Environmental Significance
MSDS	Material Safety Data Sheet
NC Act	*Nature Conservation Act 1992* (QLD)
Neoen	Neoen Australia Pty Ltd
OAMP	Offset Area Management Plan
OC	Of Concern
RE	Regional Ecosystem
VM Act	Vegetation Management Act 1999 (QLD)

1 Introduction

1.1 Project background

Neoen Australia Pty Ltd (Neoen) is proposing to construct a wind farm, known as the Kaban Green Power Hub (the 'project'). The windfarm is located approximately 6 km from the township of Ravenshoe and 80 km south-west of Cairns in far-north Queensland. The proposed project will comprise 28 wind turbines, battery storage and ancillary infrastructure such as access tracks, overhead and underground cables and meteorological masts. It is anticipated the project will be capable of generating between 420 GWh and 500GWh of electricity annually from the available wind resource to supply renewable energy to the national electricity market.

The proposed development comprises the construction and operation of:

- 28 wind turbines
- laydowns and facilities (including temporary concrete batching plant)
- access tracks (average width 45 m)
- substation and potential battery storage areas; and
- meteorology masts (met masts).

The project has been designed to avoid and mitigate impacts on Matters of National Environmental Significance (MNES), however significant residual impacts are considered likely on two MNES, including:

- *Pseudophryne covacevichae* (magnificent brood frog); and
- *Petauroides volans* (greater glider) (E2M, 2019b).

In accordance with the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act) *Environmental Offsets Policy* (EOP) compensatory offsets are required for all MNES of which the project will have a significant residual impact.

1.1.1 Project design amendment

The initial project design received approval under the EPBC Act on 21 April 2020 (EPBC 2018/8289) under conditions outlined in Appendix E. Included as part of the approval conditions (Appendix E), the project is limited to a maximum clearing limit of 129 ha of habitat for EPBC Act listed threatened species and communities within the project area. Since receiving approval, the 2020 project design has been amended to reflect the detailed design requirements undertaken by Vestas (the construction contractor) in January 2021.These design amendments have resulted in a reduction in the following changes:

- from the 2020 project design (EPBC 2018/8289: Approved 21 April 2020) – 129 ha, which included:
  - magnificent brood frog habitat– 3.0 ha; and
  - greater glider habitat– 61.2 ha.
- to the 2021 project design – 128 ha, which includes:
  - magnificent brood frog habitat– 1.4 ha; and
  - greater glider habitat– 57.2 ha.

Changes to the project do not exceed the maximum clearing limits as approved in EPBC 2018/8289: Approved 21 April 2020. This Offset Area Management Plan (OAMP) has been amended to reflect changes in the project disturbance footprint to ensure currency and transparency of project documentation and reflect the subsequent changes in the proposed offset areas. The disturbance footprint and habitat quality

scores from the 2020 project design (larger impact) have been used in this report to ensure the 2021 proposed offset areas meet the approved offset obligations of the project.

1.2 Purpose and scope

The purpose of this OAMP is to ensure improvement or maintenance of protected matters considered likely to be significantly impacted by the project, through providing guidance on the ongoing management and monitoring requirements required to achieve a conservation outcome for:

- *Pseudophryne covacevichae* (magnificent brood frog) - Vulnerable; and
- *Petauroides volans* (greater glider) - Vulnerable.

In particular, the OAMP details the following:

- Offset requirements
- Offset area assessment methodology
- Offset area description:
  - Property details
  - Site description
  - Vegetation and habitat descriptions
  - Offset values and suitability; and
  - Threats.
- Offset area management objectives and performance criteria
- Offset area management measures
- Offset area management program and monitoring schedule
- Roles and responsibilities; and
- Reporting and review requirements.

2 Offset area identification methodology

2.1 Offset requirements

The offset obligations for the project under the EPBC Act EOP were determined based on ecological assessments undertaken as part of the projects EPBC Act referral (Ref: 2018/8289). These assessments include:

- *Kaban Green Power Hub – Fauna Technical Report* (AECOM, 2017a)
- *Kaban Green Power Hub – Flora Technical Report* (AECOM, 2017b)
- *Kaban Green Power Hub – Ecological Gap Analysis* (E2M, 2019a); and
- *Kaban Green Power Hub – RFI Ecological Assessment Report* (E2M, 2019b).

As per the EPBC Act EOP, offsets are to compensate for the significant residual impacts after avoidance and mitigation measures are taken. As such, assessment of the potential significant residual impact on MNES was determined through consideration of the avoidance and mitigation measures prescribed in the following plans:

- *Kaban Green Power Hub – Vegetation Management Plan* (E2M, 2021c)
- *Kaban Green Power Hub – Fauna Management Plan* (E2M, 2021b); and
- *Kaban Green Power Hub – Bird and Bat Management Plan* (E2M, 2021a).

Assessment of the potential impacts of the project on MNES identified likely significant residual impacts on two MNES as a result of habitat removal (E2M, 2019b). Specifically, the project was considered likely to have a significant residual impact on:

- 3.0 ha of magnificent brood frog habitat; and
- 61.2 ha of greater glider habitat.

These values are the maximum clearing limits approved for the project (EPBC 2018/8289: Approved 21 April 2020) and form the basis of the projects EPBC Act offset requirements.

2.2 Offset area identification

Following determination of the project's offset obligations, an assessment of potentially suitable offset areas was undertaken. This assessment included:

1. Desktop assessment to identify:
    a. Suitable land tenures
    b. Presence of potentially suitable habitat; and
    c. Presence of existing species records.
2. Landholder consultation to assess willingness to provide land for offsets
3. Field surveys, undertaken in accordance with relevant guidelines (refer to Section 2.3), to verify:
    a. species presence
    b. habitat suitability; and
    c. habitat condition.

4. Quantification of offsets requirements based on:
    a. Habitat condition of the impact site; and
    b. Habitat condition of the offset site.

2.3 Field survey methodology

Field surveys of the offset area were undertaken as part of both the ecological assessment surveys itemised in Section 2.1 and two additional offset area surveys undertaken from:

- 17 to 21 July 2019; and
- 30 October to 4 November 2019.

The objectives of the additional field surveys were to verify offset area suitability by undertaking:

- habitat quality assessments (Section 2.3.1) within numerous vegetation communities within the project site where they had not been previously undertaken
- habitat quality assessments (Section 2.3.1) within Lot 32 on CWL254. This property is external to the project site and has not been the subject of previous surveys; and
- targeted spotlighting surveys (Section 2.3.2) to confirm species presence within the project site and Lot 32 on CWL254.

2.3.1 Habitat quality assessment

Habitat quality assessment of the impact and offset sites were in accordance with the *Guide to Determining Terrestrial Habitat Quality version 1.2* (Department of Environment and Heritage Protection, 2017). This method was used as it is the prescribed method for determining habitat quality for land-based offsets under the *Queensland Environmental Offsets Policy* and aligns with the EPBC Act *Environmental Offsets Policy*. This method measures "Habitat Quality" based on three key indicators:

- site condition (a general condition assessment of vegetation compared to a benchmark)
- site context (an analysis of the site in relation to the surrounding environment); and
- species habitat index (the ability of the site to support a species).

A map depicting the location of the habitat quality assessment sites and the detailed scoring spreadsheets (both for the impact sites and the offset sites) are presented in Appendix A.

2.3.2 Spotlight surveys

Spotlight surveys were undertaken to confirm the presence of greater glider in areas where the species had not been previously identified. Spotlight surveys were undertaken in accordance with the EPBC Act *Survey Guidelines for Australia's threatened mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011a).

Note: additional surveys for magnificent brood frog were not undertaken during the two additional offset area surveys, as the areas prescribed for offsetting for this species within this plan:

- are part of contiguous vegetation communities where the species has been previously identified
- contain habitat where the species has been previously identified; and/or
- comprise analogous areas of habitat for the species in areas where the species has not been previously recorded.

3 Offset area description

3.1 Site description

EPBC Act offset liabilities for the magnificent brood frog and greater glider will be met through the establishment of an offset areas within:

- Lot 1 on RP735194
- Lot 2 on RP735194; and
- Lot 32 on CWL254.

The total offset area is approximately 307.6 ha in size and consists of seven separate areas (Figure 1). The total area covered by indicative fencing is approximately 560.2 ha.

3.1.1 Secondary offset areas

In addition to the offset areas identified in this plan, numerous "Secondary" and "Desktop identified" offset areas were also identified. Secondary offset areas consist of field verified habitat which affords suitable offset habitat for either greater glider and/or magnificent brood frog but was not utilised in this plan due to:

- Preferred use of other areas; and/or
- Current landowner restrictions.

Desktop identified offset areas include areas of contiguous vegetation which abut the project site and contain analogous Regional Ecosystems (RE) consistent with those known to afford suitable habitat for greater glider and magnificent brood frog. However, these areas have not been field verified.

These areas are depicted in Appendix C.

3.2 Property details

3.2.1 Lot 1 on RP735194

Lot 1 on RP735194 is a freehold grazing property that forms part of the project site (Figure 1). Lot 1 on RP735194 contains predominantly remnant vegetation, comprising mixed eucalypt woodlands over underlying metamorphic rock. Lot 1 on RP735194 is bound by Bluff State Forest to the south and west; and rural properties to the north and east (Figure 1). The primary land use of the property is low-intensity cattle grazing, with areas within the eastern portion of the property have been historically cleared for improved pasture production.

Property details are identified within Table 1.

Table 1: Lot 1 RP735194 property details

Lot and Plan	Lot 1 on RP735194
Local Government Area	Tablelands Regional Council
Bioregion	• Einasleigh Uplands (Herberton – Wairuna subregion) • Wet Tropics (Atherton - subregion)
Tenure	Freehold
Offset Area	137.9 ha
Indicative Fenced Area	343.1 ha
Property Map of Assessable Vegetation (PMAV)	PMAV current (PMAV number: 2005/105739)

3.2.2 Lot 2 on RP735194

Lot 2 RP735194 is a freehold grazing property that forms part of the project site (Figure 1). Lot 2 RP735194 contains predominantly remnant vegetation, comprising mixed eucalypt woodlands over underlying metamorphic rock. Lot 2 RP735194 is bound by Bluff State Forest to the south and west, and rural properties to the north and east (Figure 1). The primary land use of the property is low-intensity cattle grazing with a small area containing an active sawmill.

Property details are identified within Table 2.

Table 2: Lot 2 RP735194 property details

Lot and Plan	Lot 2 RP735194
Local Government Area	Tablelands Regional Council
Bioregion	• Einasleigh Uplands (Herberton – Wairuna subregion) • Wet Tropics (Atherton - subregion)
Tenure	Freehold
Offset Areas	45.2 ha
Indicative Fenced Area	51.7 ha
Property Map of Assessable Vegetation	N/A

3.2.3 Lot 32 on CWL254

Lot 32 CWL254 is a freehold grazing property that abuts the eastern boundary of the project site (Figure 1). Lot 32 CWL254 contains predominantly remnant vegetation, comprising mixed eucalypt woodlands over underlying basalt plains and metamorphic rock. Lot 32 CWL254 is bound by Ravenshoe State Forest to the east; and rural properties to the south, west and north (Figure 1). The primary land use of the property is low-intensity cattle grazing with a small area containing a small mango orchard.

Property details are identified within Table 3.

Table 3: Lot 32 CWL254 property details

Lot and Plan	Lot 32 CWL254
Local Government Area	Tablelands Regional Council
Bioregion	Wet Tropics (Atherton - subregion)
Tenure	Freehold
Offset Areas	126.7 ha
Indicative Fenced Area	165.4 ha
Property Map of Assessable Vegetation	N/A

3.3 Ground-truthed regional ecosystems and habitat types

The offset area contains remnant vegetation generally consistent with vegetation communities and habitat types within the project area. These communities consist of mixed eucalypt open-forest and woodlands consistent with the Regional Ecosystems (RE) and habitat types detailed in (Table 4). These communities provide suitable habitat for magnificent brood frog and greater glider as well as numerous other MNES known or likely to occur within the offset area. Regional ecosystems and habitat types present within the offset area are depicted in Figure 2.

Table 4: Regional Ecosystems and Habitat Types within the offset area

RE	Habitat Type	RE Description	VM Act status[1]	BD status[2]	Area (ha)	MNES SRI Species Habitat	Other MNES Species Habitat
7.3.26a	Open woodland on alluvium fringing streams including elevated rock pavement communities	Riverine wetland or fringing riverine wetland. *Casuarina cunninghamiana, Eucalyptus tereticornis, Lophostemon suaveolens, Melaleuca leucadendra, M. fluviatilis, Buckinghamia celsissima, Mallotus philippensis* woodland and forest.	OC	E	0.6	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail

RE	Habitat Type	RE Description	VM Act status[1]	BD status[2]	Area (ha)	MNES SRI Species Habitat	Other MNES Species Habitat
7.8.8a	*Eucalyptus tereticornis, Eucalyptus moluccana, Corymbia intermedia* and *C. clarksoniana* woodland	*Eucalyptus tereticornis, Corymbia intermedia, E. reducta, Angophora floribunda* tall open forest and tall woodland with *Allocasuarina torulosa*. Uplands and highlands on basalt, of the moist rainfall zone.	OC	E	36.9	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail
7.8.8b	*Corymbia citriodora* and mixed Eucalypt open woodland	*Eucalyptus reducta* open forest to woodland. Uplands and highlands on basalt, of the moist rainfall zone.	OC	E	10.2	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail

RE	Habitat Type	RE Description	VM Act status[1]	BD status[2]	Area (ha)	MNES SRI Species Habitat	Other MNES Species Habitat
7.8.16a	*Corymbia citriodora* and mixed Eucalypt open woodland	*Eucalyptus resinifera, Corymbia intermedia, E. cloeziana, Syncarpia glomulifera* open forest and woodland with Allocasuarina torulosa. Uplands and highlands on basalt, of the moist rainfall zone.	OC	E	57.9	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail
7.8.18c	*Corymbia citriodora* and mixed Eucalypt open woodland	*Corymbia intermedia, Allocasuarina torulosa, Lophostemon suaveolens* open forest to woodland on basalt.	OC	OC	12.2	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail

RE	Habitat Type	RE Description	VM Act status[1]	BD status[2]	Area (ha)	MNES SRI Species Habitat	Other MNES Species Habitat
7.12.27a	*Corymbia citriodora* and mixed Eucalypt open woodland	*Eucalyptus reducta* medium open forest and woodland. Uplands and highlands on shallow granitic and rhyolitic soils, of the moist rainfall zone.	LC	NCP	20.5	• Greater Glider • Magnificent Brood Frog	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail
7.12.27c	*Corymbia citriodora* and mixed Eucalypt open woodland	*Eucalyptus resinifera* and *Syncarpia glomulifera* open woodland on shallow granitic and rhyolitic soils.	LC	NCP	5.9	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail

RE	Habitat Type	RE Description	VM Act status[1]	BD status[2]	Area (ha)	MNES SRI Species Habitat	Other MNES Species Habitat
7.12.30a	*Corymbia citriodora* and mixed Eucalypt open woodland	*Corymbia citriodora, Eucalyptus portuensis, C. intermedia, Syncarpia glomulifera* woodland to low woodland top open forest with *Callitris intratropica, Acacia calyculata*, and *Xanthorrhoea johnsonii*.	LC	NCP	146.2	• Greater Glider • Magnificent Brood Frog	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail
7.12.34	*Corymbia citriodora* and mixed Eucalypt open woodland	*Eucalyptus portuensis* and/or *E. drepanophylla*, +/- *C. intermedia* +/- *C. citriodora*, +/- *E. granitica* open woodland to open forest on uplands on granite.	LC	NCP	11.1	Greater Glider	• fork-tailed swift • ghost bat • masked owl • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • spectacled flying-fox • white-throated needletail

RE	Habitat Type	RE Description	VM Act status[1]	BD status[2]	Area (ha)	MNES SRI Species Habitat	Other MNES Species Habitat
9.12.30a	*Corymbia* and Eucalypt mixed woodland to low woodland on igneous hills and rocks	Woodland to open forest of *Corymbia leichhardtii* (yellowjacket) and *Eucalyptus cloeziana* (Gympie messmate) +/- *E. portuensis* (white mahogany) +/- *C. citriodora subsp. citriodora* (lemon-scented gum) +/- *E. cullenii* (Cullen's ironbark) +/- *Callitris intratropica* (cypress pine).	LC	NCP	8.3	Magnificent Brood Frog	• fork-tailed swift • ghost bat • northern quoll • oriental cuckoo • red goshawk • satin flycatcher • white-throated needletail

[1]VM Act status – LC = Least Concern, OC = Of Concern, E = Endangered

[2]BD (Biodiversity) status – NCP = No concern at Present, Of Concern, Endangered

3.4 Habitat description and species occurrence

3.4.1 Lot 1 on RP735194

The offset areas within Lot 1 on RP735194 consist primarily of mixed Eucalypt woodlands with a grassy understory dominated by *Themeda triandra*. Areas consistent with RE 9.12.30a have a lower tree layer and lack hollows required by greater gliders. However, these areas contain numerous *Themeda triandra* dominated drainage depressions on rhyolites of the Glen Gordan Volcanics which is the preferred habitat for magnificent brood frog (Plate 1). The remainder of the offset area within Lot 1 on RP735194 consists of a taller eucalypt dominant canopy layer containing large numbers of hollow bearing trees, suitable for greater glider (Plate 2). Drainage depressions in these areas also provide suitable habitat for magnificent brood frog. Targeted surveys for both species within Lot 1 on RP735194 identified numerous records of both species within the offset area (Figure 3). Where the species have not been recorded, habitat was consistent with areas of known locations.

The offset areas prescribed within Lot 1 on RP735194 also provide suitable habitat for numerous MNES species known or likely to occur within the site (Table 4).

Field verification surveys determined offset areas within Lot 1 on RP735194 are generally in moderate to good condition, with moderate species diversity, low weed invasion and good native ground cover (Appendix A). Although the areas tended to be in good condition, numerous threats specific to magnificent brood frog and greater glider were still identified within the offset area. These threats include:

- weed invasion
- cattle trampling
- historical bushfires; and
- clearing and thinning associated with low intensity cattle grazing.

Plate 1: Magnificent brood frog habitat within Lot 1 on RP735194 offset area (RE 9.12.30a)

Plate 2: Greater glider habitat within Lot 1 on RP735194 offset area (RE 7.12.30a)

3.4.2 Lot 2 on RP735194

The Lot 2 on RP735194 offset area consists primarily of mixed Eucalypt woodland with a grassy understorey dominated by *Themeda triandra*. The Lot 2 on RP735194 offset area contains large hollow bearing trees, suitable for greater glider, as well as small ephemeral drainage lines dominated by *Themeda triandra,* suitable for magnificent brood frog (Plate 3 and Plate 4). While neither species has been recorded within the offset area itself, targeted surveys have identified greater glider in contiguous similar habitat approximately 80 m from the offset area (Figure 3). Additionally, magnificent brood frog habitat within the Lot 2 on RP735194 offset area is consistent with habitat at known locations of the species.

The offset areas prescribed within Lot 2 on RP735194 also provide suitable habitat for numerous MNES species known or likely to occur within the site (Table 4).

Field verification surveys determined the offset area within Lot 2 on RP735194 is generally in moderate to good condition with moderate species diversity and low to moderate weed invasion (Appendix A). Although the areas tended to be in good condition, numerous threats specific to magnificent brood frog and greater glider are presented within the offset area. These threats include:

- minor weed invasion;
- cattle trampling
- historical bushfires; and
- clearing and thinning associated with low intensity cattle grazing.

Plate 3: Greater glider habitat within Lot 2 on RP735194 offset area (RE 7.12.30a)

Plate 4: Magnificent brood frog habitat within Lot 2 on RP735194 offset area (RE 7.12.30a)

3.4.3 Lot 32 on CWL254

The Lot 32 on CWL254 offset area consists primarily of mixed eucalypt woodland with a grassy understorey dominated by *Themeda triandra*. The offset areas within Lot 32 on CWL254 contains large hollow bearing trees suitable for greater glider (Plate 5 and Plate 6). The offset area occurs primarily on basalt plains so drainage lines within the area do not provide suitable habitat for magnificent brood frog. Targeted spotlighting for greater glider identified the species at multiple locations throughout the offset area (Figure 3).

The offset areas prescribed within Lot 32 on CWL254 also provide suitable habitat for numerous MNES species known or likely to occur within the site (Table 4).

Field verification surveys determined the offset area within Lot 32 on CWL254 is generally in good condition, though the area tended to have higher weed invasion then other properties (Appendix A). Threats specific to greater glider present within the offset area included:

- historical clearing for agriculture; and
- selective thinning associated with low intensity cattle grazing.

Plate 5: Greater glider habitat within Lot 32 on CWL254 offset area (RE 7.8.8a)

Plate 6: Greater glider habitat within Lot 32 on CWL254 offset area (RE 7.12.30a)

4 Offset area values and suitability

Habitat quality assessments, in accordance with the *Guide to Determining Terrestrial Habitat Quality version 1.2*, were undertaken throughout the seven offset areas nominated within this plan. A map depicting the location of the habitat quality assessment sites and the detailed scoring spreadsheets (both for the impact sites and the offset sites) are presented in Appendix A. A general description of the offset areas for each species has been summarised below.

4.1 Offset area values

4.1.1 Magnificent brood frog

4.1.1.1 Habitat

The magnificent brood frog is restricted to specific habitats consisting of small drainage depression and seeps within open eucalypt forests on rhyolites of the Glen Gordan Volcanics, with an understorey dominated *Themeda triandra, Xanthorrhoea sp., Gahnia sp., Lophostemon suaveolens, Allocasuarina littoralis* and *A. torulosa* (McDonald et al., 2000). As discussed in Section 3.4, numerous areas of suitable habitat were identified within the offset areas. Due to the specific habitat requirements of the species, field verified habitat modelling was used to determine the extent of suitable offsets within the offset area. The same model wasused during the Ecological Assessments (refer to section 2.1) to map suitable magnificent brood frog offset habitat. Suitable habitat for the species was modelled using 5 m contour mapping, on-ground seep location data and vegetation community data. Based on this model and field verification the offset area contains 16.3 ha of suitable magnificent brood frog habitat including areas in which the species has been previously recorded (Figure 3).

4.1.1.2 Threats

While the offset area contains suitable magnificent brood frog habitat, numerous threats identified within the species Approved Conservation Advice and National Recovery Plan were observed within the offset areas (McDonald et al., 2000; Threatened Species Scientific Committee, 2017). These include:

- Habitat loss / clearing
- Cattle grazing
- Weed invasion; and
- Inappropriate fire regimes.

Management measures prescribed to limit these threats within the offset areas are detailed in Section 7.4.

4.1.2 Greater glider

4.1.2.1 Habitat

The greater glider is largely restricted to Eucalypt forests and woodlands containing large tree hollows required for denning (Threatened Species Scientific Committee, 2016). Habitat mapping of the species within the impact and offset area was determined based on REs which are dominated by suitable eucalypt species for foraging and contain hollow bearing trees for denning. In total the offset area provides 301.4 ha of suitable greater glider habitat including areas in which the species is known to occur (Figure 3).

4.1.2.2 Threats

While the offset area contains suitable greater glider habitat, numerous threats identified within the species Approved Conservation Advice were observed within the offset areas (Threatened Species Scientific Committee, 2016). These include:

- Habitat loss / clearing (thinning and selective harvesting)
- Inappropriate fire regimes; and
- Barbed wire fencing entanglement.

Management measures prescribed to limit these threats within the offset areas are detailed in Section 7.4.

4.1.3 Additional MNES

Based on the field verified habitat present within the offset areas, the offset areas will also provide a conservation gain for numerous additional MNES species which are known or likely to occur within the wider project area. These species include:

- *Apus pacificus* (fork-tailed-swift)
- *Cuculus optatus* (oriental cuckoo)
- *Dasyurus hallucatus* (northern quoll)
- *Erythrotriorchis radiatus* (red goshawk)
- *Gallinago hardwickii* (Latham's snipe)
- *Pteropus conspicillatus* (spectacled flying-fox)
- *Macroderma gigas* (ghost bat); and
- *Rhipidura rufifrons* (rufous fantail).

4.2 Offset area suitability

Offset area suitability was determined based not only on field verification of suitable species habitat but other factors including:

- Species occurrence
- Connectivity
- Proximity to impact site; and
- Buffering from project impacts.

4.2.1 Species occurrence

Offset areas were preferentially selected based on existing records being located within the area itself or within contiguous suitable habitat adjoining the offset area. As discussed in Section 3.4, numerous records of both species have been identified within and/or adjacent to the offset areas (Figure 3).

4.2.2 Connectivity

Offset areas were preferentially selected where they provide connectivity between large intact expanses of remnant vegetation. As such the offset areas primarily provide connectivity between remnant areas within freehold land and large expanses of remnant vegetation associated with Bluff State Forest and Ravenshoe State Forest (Figure 1). Protection of these areas will prevent future fragmentation and promote dispersal for species within and between these areas.

4.2.3 Proximity to impact site

Offset areas were preferentially selected to protect known populations of magnificent brood frog and greater glider that occur in close proximity to the impact site and maximise the offsets potential to provide ecological benefits. Establishment of the offset area in close to the impact site protects habitat utilised by the impacted populations as well as improving the condition of habitat adjacent to the impact site to facilitate dispersal for impacted individuals. This in turn limits the potential for a long-term decrease in species abundance at the local scale.

4.2.4 Buffering from impacts

Offset area suitability also accounted for potential indirect impacts associated with the project. While indirect impacts such as erosion, sedimentation, altered hydrology and noise are considered unlikely to significantly impact the species given the management measures proposed in the Fauna Management Plan are implemented (E2M, 2021b). A 100m buffer around the proposed impact site was established to mitigate any potential impacts on the offset area. A 100m buffer is considered adequate to minimise potential indirect impacts of the project due to the dense ground cover across the site and the projects requirement to develop and implement an erosion and sediment control plan.

5 Offset availability against offset assessment guide

5.1 Magnificent brood frog offset availability

5.1.1 Summary of results

Based on the values and justification presented in Sections 5.1.2 to 5.1.11, the offset area provides approximately 111.87% of the offset obligation associated with the 3.0 ha of magnificent brood frog habitat to be impacted by the project (Table 5). The completed offset guide is provided in Appendix B.

Table 5: Offset availability assessment table

Attribute	Value
Quality of impact area	8
Quality of offset area	7
Future quality without offset	6
Future quality with offset	8
Confidence in result – future quality (%)	80%
Risk of loss without offset (%)	1.73%
Risk of loss with offset (%)	0%
Confidence in result – risk of loss (%)	80%
Time over which loss is averted (years)	20
Time until ecological benefit (years)	10
Magnificent brood frog habitat within offset area (ha)	16.3
% of impact offset	111.87%

5.1.2 Impact area

The project will impact a maximum of 3.0 ha of suitable magnificent brood frog habitat. The impact area is in remnant condition and contains minor weed invasion and moderate species diversity. Current degradation within the impact area is primarily caused through cattle grazing decreasing species diversity, particularly in the ground layer, and promoting weed invasion. Assessment of the habitat quality of the impact area identified an overall habitat quality score of 8 out of 10. Detailed habitat quality calculations are presented in Appendix A.

5.1.3 Start quality of offset area

The offset area is in remnant condition and contains minor weed invasion and moderate species diversity. The current degradation within the offset area is caused through cattle grazing activities decreasing species diversity and promoting weed invasion. Assessment of the habitat quality of the offset area identified an overall habitat quality score of 7 out of 10. Detailed habitat quality calculations are presented in Appendix A.

5.1.4 Future quality of offset area without

Major threats to magnificent brood frog include habitat loss and degradation, including degradation through cattle grazing and trampling (McDonald et al., 2000). As the offset area has degraded to a 7 out of 10 through current land practices, it is considered likely that continued grazing and unmanaged fire regimes will further degrade overall habitat quality. Continued cattle grazing and unmanaged fire regimes are likely to continue to decrease species diversity and native shrub cover while promoting further weed invasion. Further cattle grazing is also likely to impact magnificent brood frog habitat specifically through decreasing native grass abundance and degrading seep habitat and water quality through trampling. Based on these factors the future quality of the offset area without offset management is 6 out of 10.

5.1.5 Future quality of offset area with offset

It is expected that through appropriate management of the offset area, including weed management, cattle exclusion and appropriate fire regimes that the condition of the offset area can be improved. Improvement in overall habitat condition will be primarily occur through increasing ground cover species diversity, reducing weed abundance and minimisation of threats (i.e. cattle grazing). Additionally, proposed management measures are likely to improve magnificent brood frog habitat specifically through improved water quality and microhabitat availability (e.g. *Themeda triandra* abundance). Based on the implementation of these management measures it is expected that the habitat quality of the offset area can be improved to a score of 8 out of 10. Management measures are detailed in Section 7.4.

5.1.6 Confidence in result – future quality

As management measures such as weed management and cattle exclusion reduce threats on the species while increasing habitat quality through improving species diversity and recruitment of canopy species, the confidence in the offset area habitat quality being improved is rated at 80%.

5.1.7 Risk of loss without offset

E2M received advice from the Department of Agriculture, Water and the Environment (DAWE), formerly the Department of Environment and Energy (DEE), that Risk of Loss values should be based on the "*Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act*" document. This document prescribes Risks of Loss values for each local government area (National Environmental Science Programme, 2017). E2M's assessment of the guidance document identified that the value prescribed for the Tablelands Regional Council, in which the offset area is occurs, was likely to be inaccurate due to the de-amalgamation of the now Tablelands Regional Council. As such, E2M undertook a spatial analysis to determine an accurate Risk of Loss for the offset area. In summary, the assessment determined that 1.73% is considered an accurate Risk of Loss for the offset areas.

The full methodology and findings of the Risk of Loss are presented Appendix D.

5.1.8 Risk of loss with offset

The offset area will be legally secured into perpetuity in accordance within the EPBC Act *Environmental Offsets Policy*. The legally binding mechanism will be registered on the land title and will be binding on current and future landholders. A such, the risk of loss with the offset legally secured is rated at 0%.

5.1.9 Confidence in result – risk of loss

Given the offset area will be protected in perpetuity the confidence in risk of loss is rated at 80%.

5.1.10 Time over which loss is adverted

The offset area will be protected in perpetuity so the maximise period of 20 years was selected.

5.1.11 Time until ecological benefits

Given the offset area already provides suitable habitat for the species and management measures are targeted at reducing potential threats to the species, the time lag between the establishment of the offset area and ecological benefit is reduced. Additionally, weed eradication and cattle exclusions has the potential to improve species diversity and improve species habitat. Based on these factors the time until ecological benefit has been set at 10 years.

5.2 Greater glider offset availability

5.2.1 Summary of results

Based on the values presented in Sections 5.2.2 to 5.2.11, the offset area provides approximately 102.21% offset for the 61.2 ha of greater glider habitat to be impacted by the project (Table 6). The completed offset guide is provided in Appendix B.

Table 6: Offset availability assessment table

Attribute	Value
Quality of impact area	8
Quality of offset area	8
Future quality without offset	7
Future quality with offset	9
Confidence in result – future quality (%)	80%
Risk of loss without offset (%)	1.73%
Risk of loss with offset (%)	0%
Confidence in result – risk of loss (%)	80%
Time over which loss is averted (years)	20
Time until ecological benefit (years)	10
Greater glider habitat within offset area (ha)	301.4
% of impact offset	102.21%

5.2.2 Impact area

The project will impact a maximum of 61.2 ha of greater glider habitat. The area is in remnant condition and has a low level of weed invasion. The area does contain moderate levels of threats including historical clearing, low intensity cattle grazing and high intensity fires. Assessment of the habitat quality of the impact area identified an overall habitat quality score of 8 out of 10. Detailed habitat quality calculations are presented in Appendix A.

5.2.3 Start quality of offset area

The offset area habitat and condition is primarily consistent with the impact area. The offset area is in remnant condition and contains minor weed invasion and moderate species diversity. The current degradation within the offset area is primarily caused through historical cattle grazing decreasing species diversity and promoting weed invasion. Assessment of the habitat quality of the offset area identified an overall habitat quality score of 8 out of 10. Detailed habitat quality calculations are presented in Appendix A.

5.2.4 Future quality of offset area without

Threats to greater glider include habitat loss (i.e. clear felling, logging), intense and frequent fires, and barbed wire fence entanglement (Threatened Species Scientific Committee, 2016). As the offset area has degraded to an 8 out of 10 through current land practices, it is considered likely that continued grazing and unmanaged fire regimes will further degrade overall habitat quality. Continued cattle grazing and unmanaged fire regimes are likely to continue to decrease species diversity and native shrub cover while promoting further weed invasion. Inappropriate management of these threats may impact greater glider habitat specifically through reducing the availability of denning and foraging trees via selective thinning or high intensity bushfires. Cattle grazing in the long-term may also reduce canopy species recruitment which will further decrease the future quality greater glider habitat. Based on these factors the future quality of the offset area without offset management is considered to be 7 out of 10.

5.2.5 Future quality of offset area with offset

It is expected that through appropriate management of the offset area, including weed management, cattle exclusion and appropriate fire regimes that the condition of the offset area can be improved. Improvement in overall habitat condition will be primarily through increased shrub cover, ground cover species diversity, reduced weed abundance. Additionally, proposed management measures are likely to improve greater glider habitat specifically through protection of large trees which may provide suitable den habitat in the now or in the future. Based on the implementation of these management measures it is expected that the condition of the offset area can be improved to a score of 9 out of 10. Management measures are detailed in Section 7.4.

5.2.6 Confidence in result – future quality

As management measures such as weed management and cattle exclusion reduce threats on the species while increasing habitat quality through improving species diversity and recruitment of canopy species, the confidence in the offset area habitat quality being improved is rated at 80%.

5.2.7 Risk of loss without offset

E2M received advice from the DAWE that Risk of Loss values should be based on the "*Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act*" document. This document prescribes Risks of Loss values for each local government area (National Environmental Science Programme, 2017). E2M's assessment of the guidance document identified that the value prescribed for the Tablelands Regional Council, in which the offset area is occurs, was likely to be inaccurate due to the de-amalgamation of the council after the document's assessment. As such, E2M undertook a spatial analysis to replicate the methodology prescribed and determine an accurate Risk of Loss for the offset area. In summary, the assessment determined that 1.73% is considered an accurate Risk of Loss for the offset areas.

The full methodology and findings of the Risk of Loss are presented Appendix D.

5.2.8 Risk of loss with offset

The offset area will be legally secured into perpetuity in accordance within the EPBC Act *Environmental Offsets Policy*. The legally binding mechanism will be registered on the land title and will be binding on current and future landholders. A such, the risk of loss with the offset legally secured is rated at 0%.

5.2.9 Confidence in result – risk of loss

Given the offset area will be protected in perpetuity the confidence in risk of loss is rated at 80%.

5.2.10 Time over which loss is adverted

The offset area will be protected in perpetuity so the maximise period of 20 years was selected.

5.2.11 Time until ecological benefits

Given the offset area already provides suitable habitat for the species and management measures are targeted at reducing potential threats to the species, the time lag between the establishment of the offset area and ecological benefit is reduced. Although weed invasion within the offset area is currently low, weed eradication and cattle exclusions has the potential to improve species diversity and recruitment of canopy species. Based on these factors the time until ecological benefit has been set at 10 years.

6 Securing the offset

The offset area will be legally secured into perpetuity in accordance within the EPBC Act *Environmental Offsets Policy*. The legal mechanism of securing the offset is under investigation and will be confirmed in consultation within the regulators and the landholder and may include:

- Conservation agreements under the EPBC Act
- A voluntary declaration under the *Vegetation Management Act 1999*
- A protected area (including a nature refuge) under the *Nature Conservation Act 1992*
- Another mechanism specified under the regulation, (including a statutory covenant) under the *Land Act 1994* or *Land Title Act 1994*.

Legal securement of the offset with occur within 12 months of commencement of the action, and remain in force for at least the duration of the approval. The offset area management plan will be attached to the legal mechanism used to legally secure the offset areas.

DAWE will be notified within five business days of the legal security mechanism for each offset area being executed..

7 Offset area management

7.1 Objectives

The offset area aims to achieve a conservation gain for magnificent brood frog and greater glider through the long-term securement and improvement of habitat for the species through the active management and protection of the area. Specifically, the OAMP will aim to:

- Ensure the persistence of magnificent brood frog and greater glider within the offset areas
- Protect the offset area from all future clearing
- Prevent the introduction and spread of invasive weeds within the offset area
- Protect the area from high-intensity wildfires that may impact site vegetation and species habitat suitability; and
- Improve the ecological condition of offset area through weed management, exclusion of cattle and implementation of appropriate fire regimes.

7.2 Performance criteria

The effectiveness of the OAMP in achieving the objectives identified in Section 7.1 will be assessed against the following performance criteria:

1. No clearing occurs within the offset area
2. Magnificent brood frog abundance remains stable or increases within the offset area
3. Greater glider abundance remains stable or increases within the offset area
4. No new weeds are introduced to the offset area
5. Existing weed invasion within the offset area decreases
6. Greater glider friendly cattle fencing is erected and maintained
7. Offset area Habitat Quality score improves by a minimum of 1 point within 10 years; and
8. Fuel loads are managed to limit potential of high intensity bush fires.

7.3 Threat analysis

A threat analysis was undertaken to assess known and potential threats which may prevent the OAMP's performance criteria and management objectives being met. Table 7 identifies the potential threats associated with the proposed management measures and the corrective actions to be undertaken if the threat occurs. Threats identified in this section are derived from known magnificent brood frog and greater glider threats specified in the species' Approved Conservation Advice and National Recovery Plan.

Table 7: Threat analysis table

Threat	Control	Corrective action	Residual risk level
Weed species are introduced or spread within the offset area	• Ongoing weed control and monitoring • Vehicle hygiene protocols	• Additional weed control and monitoring • Update vehicle hygiene procedures	Moderate
High intensity bushfire	Maintenance of a fire break, monitoring and management of fuel loads including prescribed burns where necessary	Allow for natural regeneration and where required utilise assisted rehabilitation works	Moderate
Cattle grazing and tramping	Erection of cattle proof fencing	Remove cattle and repair/improve fencing	Low
Cane toad population proliferation	Currently, cane toad abundance within the offset areas is low. Control measures are limited to ongoing monitoring for increased abundance of cane toads within offset areas.	Undertake a detailed review of available information concerning the management of cane toads and implement appropriate management measures within the offset areas.	Low
Chytrid fungus introduction	Implementation of state and federal amphibian handling hygiene protocols	• Remove potentially infected individuals from the site and send for disease diagnosis • Investigate new strategies to prevent spread	Moderate

7.4 Management measures

Management measures proposed to be undertaken within the offset area include weed management, cane toad management, cattle exclusion fencing, chytrid fungus management and fire management. Each management measure is detailed in Section 7.4.1 to Section 7.4.5, with the associated implementation and monitoring schedule specified in Section 7.5.

7.4.1 Weed management measures

Weed management within the offset area will include the management 'priority' weeds as described in the *Kaban Green Power Hub – Vegetation Management Plan* (E2M, 2021c). These weeds include:

- *Biosecurity Act 2014* 'Restricted Matter' and 'Prohibited Matter' plant species,
- Locally declared weeds under the *Tablelands Regional Council 2019-2024 Biosecurity Plan (TRC Biosecurity Plan)* (Tablelands Pest Management Advisory Committee, 2019); and

- high biomass exotic grasses and forbs which can quickly invade disturbed areas and degrade threatened species habitat.

Weed control techniques to be implemented in the offset area are identified within Table 8. These techniques generally fall into two broad weed control methods; mechanical removal and chemical treatment.

Mechanical controls are generally the first actions implemented during weed control. Mechanical control should be restricted to areas not susceptible to soil erosion. Mechanical control methods include:

- Manual removal by hand or grubbing using loppers, hatchets or small saws to remove the weed (including roots); and
- Lopping of the weed using an axe or chainsaw.

Due to the potential harmful impact of chemicals on magnificent brood frog, mechanical removal is the preferred management method within the or adjacent to magnificent brood frog habitat. However, if herbicide use is required to control weed infestations, only herbicides designed specifically for use within the vicinity of waterways are to be used (i.e. with herbicides used Chemical control should be used when mechanical controls are not appropriate (e.g. Roundup® BioactiveTM Herbicide or Weedmaster® Herbicide). Additionally, chemical control must only be undertaken by a suitably qualified person (i.e. Agriculture Chemical Distribution Control certified) in accordance with the Material Safety Data Sheet (MSDS). Mixing of chemicals or rinsing of equipment must never occur adjacent to water bodies.

Table 8: Weed Control Techniques

Plant Form	Examples	Method
Woody weeds	• Wild tobacco (*Solanum mauritianum*) • Lantana (*Lantana camara*)	Large trees may require felling followed by immediate application of herbicide to the cut stump or can be killed in-situ through the stem-injection of herbicide via drilled holes or frilling. Control smaller woody weeds using the cut-scrape-paint technique, where stems are cut near the ground and are immediately painted with herbicide. Juvenile woody weeds may be removed by hand or treated with chemical spraying.
Herbs	• Praxelis (*Praxelis clematidea*) • cobbler's pegs (*Bidens pilosa*) • urena burr (*Urena lobata*)	Herbaceous plants may be controlled through manual hand weeding, crowning or spraying with herbicide such as in the spot-spray technique.
Grasses	• grader grass (*Themeda quadrivalvis*) • thatch grass (*Hyparrhenia rufa*) • guinea grass (*Megathyrsus maximus*) • signal grass (*Urochloa decumbens*)	Dense infestations of grasses may require mechanical slashing before applying herbicide to regrowth. Isolated individual plants may be hand pulled or crowned.

Plant Form	Examples	Method
Vines	• asparagus fern (*Asparagus aethiopicus*) • glycine (*Neonotonia wightii*) • white passion flower (*Passiflora subpeltata*)	Use the cut-scrape-paint method to kill mature vines. If the vine has extended into the canopy, avoid pulling the vine from the canopy to avoid damage to the tree. Regrowth of weed vine species may be treated using spot-spray treatment with herbicide.

Detailed methodology for weed control techniques discussed in Table 8 and herbicide application rates can be found in:

- Queensland Government fact sheets for declared weeds, available at https://www.business.qld.gov.au/industry/agriculture/species/declared-pests/weeds

7.4.2 Fencing and access

Cattle exclusion fencing will be erected around the entirety of the offset area. As the erection of fencing may cause additional impacts to species habitat, where possible existing fence lines will be utilised. Where new fences are to be erected, clearing will be minimised. If existing fence lines are to be utilised, they must be assessed for damage and repaired where required. In areas of greater glider habitat, all fencing must have a barbless top-strand to limit potential entanglement of the greater glider. Indicative fencing locations are presented in Figure 3.

Access to the offset area will be restricted to authorised personnel only who have completed the necessary induction requirements.

7.4.3 Cane toad management

Cane toads currently occur at low abundance across the offset areas but have the potential to adversely impact native fauna species including the magnificent brood frog. Past efforts to manage broad scale control and/or eradication of cane toads has proven ineffective(Department of Sustainability, Environment, Water, Population and Communities, 2011b). Therefore, cane toad management within the offset areas will be confined to ongoing monitoring of cane toad populations. Where an increase in cane toads is identified at any of the offset area sites, a detailed review of available information concerning the management of cane toads will be undertaken. Appropriate management measures resulting from this investigation will be implemented within the offset areas.

7.4.4 Chytrid fungus

The potential introduction/spread of chytrid fungus into the magnificent brood frog population within the offset area will be managed through limiting access to the area to only authorised personnel who have completed the necessary site induction requirements and ensuring all surveying and/or handling of amphibian species within the offset area occur in accordance with state and federal disease control protocols; including:

- *Hygiene protocols for the control of diseases in Australian frogs* (Murray et al., 2011); and
- *Technical Manual: Interim hygiene protocol for handling amphibians* (Department of Environment and Heritage Protection, 2016).

7.4.5 Fire management

Altered fire regimes are interrelated with confounding environmental threats including weed encroachment, changes to vegetation structure and damage to fire sensitive vegetation communities (Wet Tropics Management Authority, 2014). While there is no published information on the response of magnificent brood frog to altered fire regimes it is known that frequent and/or intense fires can reduce habitat suitability for greater glider through destruction of habitat trees (Threatened Species Scientific Committee, 2016). As such a fire management program will be established for the offset area and incorporate fire guidelines for REs within the offset area. Details of the specific fire guidelines for each RE is presented in Table 9 (Queensland Herbarium, 2019).

Table 9: Fire Management Guidelines for REs located within the Offset Area

RE	Season	Intensity	Interval	Strategy	Issues
7.3.26a	Do not burn deliberately.	Do not burn deliberately.	Do not burn deliberately.	Perimeter burning early in the fire season may limit the extent and intensity of wildfire incursions.	Coastal she-oaks and river oaks are sensitive to fire.
7.8.8a / 7.8.8b	Cool, dry season (June-Sep)	Low to moderate.	2-5 years	Mosaic burn < 30%. Begin burning early in the fire season, with progressive patch fires burnt through the year. Stop burning when the network of fires and other breaks is sufficient to impede fire spread later in the year. Storm-burning may be used to add further diversity to the fire mosaic.	Ignition is most likely during hot, dry season (Oct - Jan). These fires are typically high intensity fires that can be difficult to control.
7.8.16a	After the wet season when rain is reliably expected and there is good soil moisture. Burning in the dry season (Oct-Dec) will give high intensity fires.	Low to moderate with occasional high to control overabundance of tree recruitment in mid-stratum.	3-5 years for grassy understorey. 6-10 years for shrubby understorey.	Burn progressively in a mosaic of <30% of area. Begin burning early in the fire season, with progressive patch fires burnt through the year. Stop burning when the network of fires and other breaks is sufficient to impede fire spread later in the year. Storm-burning may be used to add further diversity to the fire mosaic. If burning these ecosystems using high intensity fire then protect adjacent communities using secure perimeter burns.	High intensity fires can be used to control an over-abundance of mid-storey recruitment; once controlled return to normal fire regime. Follow-up fires may be required to control more advanced tree recruitment
7.8.18c	Cool, dry season (April-Sep)	Low to moderate.	2-5 years	Mosaic burn < 30%. Begin burning early in the fire season, with progressive patch fires burnt through the year. Stop burning when the network of fires and other breaks is sufficient to impede fire spread later in the year. Storm-burning may be used to add further diversity to the fire mosaic.	An occasional moderate severity fire may be used to manage overabundant recruitment of trees. Maintaining a fire mosaic will ensure protection of animal habitats and mitigate against wildfires.

RE	Season	Intensity	Interval	Strategy	Issues
7.12.27a / 7.12.27c	Cool, dry season (June-Sep)	Low to moderate.	2-5 years	Mosaic burn < 30%. Begin burning early in the fire season, with progressive patch fires burnt through the year. Stop burning when the network of fires and other breaks is sufficient to impede fire spread later in the year. Storm-burning may be used to add further diversity to the fire mosaic.	Ignition is most likely during hot, dry season (Oct - Jan). These fires are typically high intensity fires that can be difficult to control. Occasional high intensity fires will assist in maintaining integrity of structure and floristics. Fuel loads of kangaroo grass, blady grass and kerosene grass need to be established to permit fires that are necessary for eucalypt regeneration in these communities.
7.12.30a	Cool, dry season (April-Sep)	Low to moderate.	2-5 years	Mosaic burn < 30%. Begin burning early in the fire season, with progressive patch fires burnt through the year. Stop burning when the network of fires and other breaks is sufficient to impede fire spread later in the year. Storm-burning may be used to add further diversity to the fire mosaic.	An occasional moderate severity fire may be used to manage overabundant recruitment of trees. Maintaining a fire mosaic will ensure protection of animal habitats and mitigate against wildfires.
7.12.34	Cool, dry season (April-Sep)	Low to moderate.	2-5 years	Mosaic burn < 30%. Begin burning early in the fire season, with progressive patch fires burnt through the year. Stop burning when the network of fires and other breaks is sufficient to impede fire spread later in the year. Storm-burning may be used to add further diversity to the fire mosaic.	An occasional moderate severity fire may be used to manage overabundant recruitment of trees. Maintaining a fire mosaic will ensure protection of animal habitats and mitigate against wildfires.

RE	Season	Intensity	Interval	Strategy	Issues
9.12.30a	Early dry season and storm time. Timing of early dry season burns will vary depending on seasonal conditions; it may sometimes commence as early as March. Avoid burning August-October when south-easterly winds are typically strongest.	Low, with occasional moderate or high.	5-10 years	Apply mosaic across the landscape at a range of frequencies to create varying stages of post-fire response.	These ecosystems contain shrubs that germinate after fire. Seedlings typically take a number of years to mature. Avoid repeated fires at short intervals and high intensity burns of broad areas. Leave areas of long unburnt vegetation to maintain a diversity of habitat for wildlife. Shrub species diversity will decline if areas are left long unburnt. *Callitris intratropica* are fire sensitive. Protect from fires until plants old enough to replace seed pool.

7.5 Management program and monitoring schedule

Table 11 details the schedule for the management measures and monitoring requirements associated with the OAMP, with specific monitoring requirements and impact triggers for magnificent brood frog, greater glider and habitat quality specified in Section 7.5.1 and Section 7.5.3.

7.5.1 Magnificent brood frog monitoring requirements

Magnificent brood frog surveys will be conducted to determine continual presence of the species within the offset area and assess microhabitat condition, including the presence and abundance of:

- sedimentation; and
- hydrocarbons.

Both magnificent brood frog abundance and microhabitat assessments surveys will be undertaken across two different monitoring site types: including:

- Offset sites (3 replicates) – sites occur within the proposed offset area where the species is known or likely to occur. These sites will aim at determining the species continued presence within the offset site; and
- Off-site control sites (3 replicates) - sites occur in nearby National Parks and State Forests in suitable habitat where the species is known to occur. These sites will act as a control by assisting in determining whether changes in magnificent brood abundance at the offset sites are caused by management practices or due to non-project related factors (e.g. climatic variation). The location of these sites within protected areas minimises the potential that control sites are impacted by anthropogenic impacts.

[1]Indicative monitoring sites are presented in Figure 4.

7.5.1.1 Relative abundance surveys

Magnificent brood frog monitoring will occur to determine continual presence of the species within the offset area. Surveys will be conducted in accordance with the survey guidelines prescribed in the Species Profile and Threats Database (Department of Environment and Energy, 2019). This consists of acoustic transect surveys in known species locations within the offset area during suitable survey conditions (wet season). Transects should be a minimum of 200m long with surveys repeated over two consecutive nights. Surveys will be undertaken across all monitoring sites (Offset sites and Off-site control sites).

Additionally, targeted surveys will also be conducted in previously unsurveyed areas of suitable habitat located within the offset area. These surveys will aid in further delineation of magnificent brood frog habitat, which is a primary objective of the National Recovery Plan (McDonald et al., 2000).

7.5.1.2 Microhabitat assessment

Magnificent brood frog microhabitat assessments will be undertaken to assist in confirming offset areas are not indirectly impacted by the project, including the increase of sedimentation and hydrocarbons in magnificent brood frog habitat. These microhabitat features will be assessed through the establishment of photo monitoring plots at ponded/seep areas along each relative abundance survey transect. Each

[1] These sites are only indicative and may vary depending on the suitability of sites assessed during the baseline monitoring survey.

transect will have a minimum of two photo monitoring plots, with one to be established at the nearest ponded/seep area downstream of the disturbance footprint. Microhabitat assessment photo monitoring points will be taken from approximately 1 m high facing directly down at the ponded/seep area and cover an area of approximately 1x1m.

7.5.1.3 Survey timing

Magnificent brood frog surveys will be undertaken during the suitable survey conditions occurring within the species calling period (December to May). Suitable survey conditions are considered within a four week period, any time after a substantial rainfall event (100 mm over a five-day period) during the species calling period. If a substantial rainfall event has not occurred before March, surveys will be undertaken at anytime during March to May period.

7.5.1.4 Impact triggers

To determine whether the magnificent brood frog populations are not declining within the offset area, specific impact triggers have been established. These impact triggers compare baseline magnificent brood frog relative abundances against on-going monitoring results. These triggers include:

- 30% reduction in the average relative abundance of magnificent brood frog across all offset sites between two monitoring events (i.e. over a one year); and/or
- 50% reduction in the relative abundance of magnificent brood frog at an individual offset site between two monitoring events (i.e. over a one year); and/or
- continued 10% reduction (10% per year over five years) in the relative abundance of magnificent brood frog across all offset sites.

Note: Monitoring results will be assessed against control sites to determine whether comparable declines also occur. Comparable changes in magnificent brood frog abundance at both control sites and offset sites suggest a non-project related cause, such as climatic variation.

7.5.2 Greater glider monitoring requirements

Greater glider monitoring will occur to determine continual presence of the species within the offset area. Spotlight transects are a standard method used to survey nocturnal arboreal fauna, including greater glider (Department of Sustainability, Environment, Water, Population and Communities 2011). As such, the continual presence of greater glider within the offset area will be determined using standardised spotlight transects. A minimum of three permanent 500m long spotlight transects will established within the offset area. Each transect will be surveyed for approximately 60mins and replicated over two consecutive nights. Indicative monitoring sites are presented in Figure 4.

7.5.2.1 Impact triggers

To determine whether the greater glider populations are not declining within the offset area, specific impact triggers have been established. Due to the likely low abundance of individuals per transect the impact triggers for greater gliders

- The absence of the species across all monitoring sites in a single monitoring event; and/or
- The absence of the species at a single monitoring site for three consecutive years.

7.5.3 Habitat Quality Assessment / Photo monitoring

Overall habitat condition within the offset area will assessed through undertaking Habitat Quality Assessments, in accordance with the *Guide to Determining Terrestrial Habitat Quality version 1.2*. To monitor habitat condition improvement over time, three permanent transects will be established within

both magnificent brood frog and greater glider offset areas. At the centre of each transect a photo monitoring site will be established to assist in depicting changes in condition. Four photos will be taken at each photo monitoring point, at a height of approximately 1.5m high, in a north, south, east and west direction. Indicative monitoring sites are presented in Figure 4.

7.5.3.1 Impact triggers

To ensure the performance criteria of at least a 1-point increase in habitat quality is reach within 10 yearsfrom the commencement of the action, the following impact triggers have been identified to determine where corrective actions are required. Impacts triggers include:

- Increase in weed cover within any monitoring site; and/or
- Introduction of a new priority weed species into any monitoring site; and/or
- Decrease in species diversity when compared to previous years results.

Additionally, Table 10 prescribes indicative five-yearly completion criteria which monitoring results can be measured to ensure a 1-point increase in habitat quality is reached. While compliance will not be measured or reported on these criteria, they do provide a means to compare monitoring results and track progress. The habitat quality features detailed in Table 10 are based on the most likely areas of improvement within the offset area and the estimated time for improvement to occur. The removal of threats (e.g. cattle, selective clearing, barb wire, etc.) is expected to have an almost immediate influence on the habitat quality; while availability of shelter, non-native shrub cover and ground cover (grass and forb) species richness will be recognised within ten years (Table 10).

Note: After the the completion criteria have been met, offsets will continued to be monitored/managed for the duration of the approval to ensure the completion scores are maintained or improved.

Table 10: Indicative five-yearly habitat quality completion criteria scores

Feature	Year					
	0	5	10	15	20	25
Magnificent brood frog						
Native plant species richness - grasses	3	3	5	5	5	5
Native plant species richness – forbs	3	3	5	5	5	5
Native shrubs canopy cover	3	3	5	5	5	5
Non-native plant cover	3	3	5	5	5	5
Threats to species	7	15	15	15	15	15
Quality and availability of shelter	5	10	10	10	10	10
Greater glider						
Native plant species richness - grasses	3	3	5	5	5	5
Native plant species richness – forbs	3	3	5	5	5	5
Native shrubs canopy cover	3	3	5	5	5	5
Non-native plant cover	3	3	5	5	5	5
Threats to species	7	15	15	15	15	15

Table 11: Management program and monitoring schedule

Action	Undertaken by	Details	Frequency	Corrective Actions
Weed management				
Weed distribution survey	Independent Ecologist	Weed distribution surveys will be undertaken to identify the distribution and abundance of weeds within the offset area including identification of any new occurrences.	Annually for the first 10 years to ensure a reduction in the current levels of weed infestation and prevent establishment of new weed species within the offset area. Then every 5 years thereafter for the life of the approval.	• Investigate potential source of weed invasion • Investigate new weed management techniques • Increase frequency of weed management where required • Update vehicle hygiene procedures • Update OAMP as required
Active weed control	Rehabilitation contractor	Weed removal will be undertaken to manage existing weeds within the offset area and any new infestations identified during monitoring.	Annually for the first 10 years to ensure a reduction in the current levels of weed infestation and prevent establishment of new weed species within the offset area. Then every 5 years thereafter for the life of the approval.	
Weed prevention	All approved personnel to offset area	All vehicles, equipment and machinery entering the offset area are to be certified as clean by an accredited weed hygiene inspector (AHCBIO201A) or have come from a weed free portion of the construction site.	As required.	
Fencing and access				
Fencing	Fencing contractor or landowner	Cattle exclusion fencing will be erected around the entirety of the offset site. In areas of greater glider habitat, the top strand of fencing is to be barbless.	Exclusion fencing must be erected within 1 year of the offset area being secured, with monitoring of the condition opportunistically monitored during other monitoring requirements	• Remove cattle • Repair fencing where required

Action	Undertaken by	Details	Frequency	Corrective Actions
Access	All approved personnel to offset area	All personnel to the offset area are to have completed the necessary induction requirements.	As required.	• Utilise interim fencing until repairs have been completed
Chytrid fungus management				
Hygiene protocols	All personnel	Any personnel surveying and/or handling amphibian species will follow state and federal disease control protocols prescribed in Section 7.4.3.	As required.	• Remove potentially infected individuals from the site and send for disease diagnosis • Investigate potential source of chytrid fungus introduction • Investigate whether management measures have been identified to control chytrid fungus spread • Update OAMP as required
Fire management				
Controlled burns	TBC	In accordance with the Bushfire Management Plan which incorporates RE Fire Management Guidelines listed in Section 7.4.5.	In accordance with the Bushfire Management Plan which incorporates RE Fire Management Guidelines listed in Section 7.4.5.	• Investigate alternative fire management regimes and techniques • Provide assisted rehabilitation where required • Update OAMP as required
Fuel loads	TBC	Fuel loads must be monitored during annual weed monitoring and management	As required	
Fire breaks	TBC	Fire breaks will be established and managed in accordance with Bushfire Management Plan	As required	

Monitoring				
Magnificent Brood Frog surveys	Independent Ecologist	Refer to Section 7.5.1.	Annually for the first five years then every five years thereafter for the life of the approval. Additionally, annual monitoring will occur for three years following a significant stochastic event (e.g. uncontrolled bushfire).	• Investigate reason for low species abundance or absence • Undertake additional surveys if species not identified • Develop additional management measures to improve species abundance • Update OAMP as required
Greater Glider surveys	Independent Ecologist	Refer to Section ¤.	Annually for the first five years then every five years thereafter for the life of the approval. Additionally, annual monitoring will occur for three years following a significant stochastic event (e.g. uncontrolled bushfire).	• Investigate reason for low species abundance or absence • Undertake additional surveys if species not identified • Develop additional management measures to improve species abundance • Update OAMP as required
Habitat Quality Assessment / photo monitoring	Independent Ecologist	Refer to Section 7.5.3.	Habitat Quality assessments will be undertaken every 2 years until the performance criteria has been met, then every 5 years thereafter for the life of the approval.	• Investigate why performance criteria are not being reached • Undertake additional weed control where required • Undertaken rehabilitation works if required

8 Roles, responsibilities and training

8.1 Roles and responsibilities

The roles and responsibilities assigned to individuals are outlined in Table 12.

Table 12: Roles and responsibilities

Roles	Responsibility
Project Manager	Oversee implementation of OAMP management measures and monitoring
Project Environment Officer	• Monitor and guide rehabilitation contractor weed management works • Ensure all site personnel are inducted and made aware of the requirements of the OAMP
Fencing contractor	Construct cattle exclusion fencing
Rehabilitation contractor	Undertake weed management
Independent Ecologist	Undertake monitoring in accordance with the OAMP, including: • Magnificent brood monitoring surveys • Greater glider monitoring surveys; and • Habitat Quality assessment / photo monitoring surveys.
All site personnel	• Complete induction • Abide with OAMP

8.2 Training requirements

To ensure the effectiveness of the OAMP all personnel entering or undertaking works within the offset area will be required to complete an induction detailing the specific requirements outlined in the OAMP. These include but are not limited to the following:

- Weed prevention and management measures
- General fire awareness and response procedures
- Amphibian handling hygiene protocols
- Vehicle and personnel access requirements; and
- Notification procedures for identification of potential threats.

9 Reporting, evaluation and review

9.1 Reporting requirements

An annual report will be provided to the DAWE by June 30 each year detailing progression against the performance criteria. The report will include but not be limited to the following:

- EPBC approval number
- lot on plan property description and postal address
- climatic conditions for the year of management
- an overview of the management activities undertaken within the year of management
- results of monitoring events undertaken within the year of management including, where relevant for that year, results associated with:
  - magnificent brood frog surveys
  - greater glider surveys
  - Habitat Quality monitoring / photo monitoring
- schedule for management activities to be undertaken in upcoming year
- risks or threats identified, and corrective actions undertaken
- management and monitoring recommendation to be incorporated into the OAMP.

9.2 Evaluation and review

This OAMP is a living document that requires review and amendment throughout the life of the offset to ensure that measures within this document remain effective. It is recommended that this document be updated:

- Where annual monitoring reports identify that the performance criteria are not being met and additional measures may be required. Table 13 prescribes example additional mitigation measures which may be investigated where performance criteria are not being met; or
- Where a change in legislation or best practice methodology has been identified.

Any updates to the OAMP will be submitted to DAWE for review and to enable the provision of feedback.

Table 13: Example management measures to be investigated where performance criteria are not being met

Non-compliances	Mitigation measure[1]	Likelihood of impact continuing	Implementation schedule
Uncontrolled bushfire removes hollow bearing trees and impacts magnificent brood frog habitat	• Alter fire management program • Install nest boxes in impacted areas as compensatory hollows • Provide compensatory shelter for magnificent brood frog (e.g. roofing tiles) • Undertake assisted rehabilitation in impacted areas	Low	As soon as possible
Weed abundance increases within offset area	• Increase weed control measures • Increase offset area access restrictions	Low	As soon as possible
Species diversity decreases within offset area	• Undertake assisted rehabilitation and supplementary planting • Increase weed control measures	Low	As soon as possible

10 References

AECOM. (2017a). *Kaban Green Power Hub—Fauna Technical Report*.

AECOM. (2017b). *Kaban Green Power Hub—Flora Technical Report*.

Department of Environment and Energy. (2019). *Species Profile and Threats Database—Pseudophryne covacevichae (Magnificent Brood Frog)*. http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64385

Department of Environment and Heritage Protection. (2016). *Technical manual: Interim hygiene protocol for handling amphibians*. Queensland Government.

Department of Environment and Heritage Protection. (2017). *Guide to determining terrestrial habitat quality A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy Version 1.2*. Queensland Government.

Department of Sustainability, Environment, Water, Population and Communities. (2011a). *Survey guidelines for Australia's threatened mammals*. Australian Government.

Department of Sustainability, Environment, Water, Population and Communities. (2011b). *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*.

E2M. (2019a). *Kaban Green Power Hub – Ecological Gap Analysis*.

E2M. (2019b). *Kaban Green Power Hub RFI - Ecological Assessment Report*.

E2M. (2021a). *Kaban Green Power Hub – Bird and Bat Management Plan*.

E2M. (2021b). *Kaban Green Power Hub – Fauna Management Plan*.

E2M. (2021c). *Kaban Green Power Hub – Vegetation Management Plan*.

McDonald, K. R., Bolitho, E., Dennis, A., Simpson, N., & Winter, J. W. (2000). *Recovery Plan for the magnificent broodfrog Pseudophryne covacevichae 2000-2004*. Environment Australia, Canberra.

Murray, K., Skerratt, L., Marantelli, G., Berger, L., Hunter, D., Mahony, M., & Hines, H. (2011). *Hygiene protocols for the control of diseases in Australian frogs*. Australian Government Department of Sustainability, Environment, Water, Population and Communities.

National Environmental Science Programme. (2017). *Guide for deriving 'Risk of Loss" estimates when evaluating biodiversity offset proposals under the EPBC Act*.

Queensland Herbarium. (2019). *Regional Ecosystem Description Database v.11*. Department of Environment and Science.

Tablelands Pest Management Advisory Committee. (2019). *Tablelands Regional Council 2019-2024 Biosecurity Plan V2.0*.

Threatened Species Scientific Committee. (2016). *Approved Conservation Advice for Petauroides volans (greater glider)*. Department of the Environment.

Threatened Species Scientific Committee. (2017). *Approved Conservation Advice for Pseudophryne covacevichae (Magnificent brood frog)*.

Wet Tropics Management Authority. (2014). *Wet Tropics Conservation Strategy: The conservation, rehabilitation and transmission to future generations of the Wet Tropics World Heritage Area*.

Appendix A Habitat Quality Assessments

A.1 Magnificent Brood Frog Impact Site

Assessment Type (Impact Site / Offset Site):		AU 1			AU 1			AU 1			AU 1			AU 1			AU 1		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented		
Assessment Site No.:		HQ8			HQ13			HQ10			HQ15			BC114			BC113		
Regional Ecosystem:	7.12.27 (Draft)* (Same BVG)	7.12.27c			7.8.8b			7.12.27c			7.12.27a			7.12.27a			7.8.8b		
BVG1M:	9d	9d			9d			9d			9d			9d			9d		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	100.0	1.0	5	75.0	0.8	5	100.0	1.0	5	50.0	0.5	3	80.0	0.8	5	50.0	0.5	3
2. Native plant species richness (No.):																			
- Trees	5	4.0	0.8	3	5.0	1.0	5	6.0	1.2	5	6.0	1.2	5	5.0	1.0	5	6.0	1.2	5
- Shrubs	12	2.0	0.2	0	4.0	0.3	3	6.0	0.5	3	5.0	0.4	3	6.0	0.5	3	4.0	0.3	3
- Grasses	6	10.0	1.7	5	6.0	1.0	5	3.0	0.5	3	5.0	0.8	3	3.0	0.5	3	2.0	0.3	3
- Forbs	11	10.0	0.9	5	8.0	0.7	3	12.0	1.1	5	4.0	0.4	3	7.0	0.6	3	5.0	0.5	3
3. Tree canopy height (m):																			
- Canopy Layer	19	19.0	1.0	5	18.0	0.9	5	17.0	0.9	5	15.0	0.8	5	15.2	0.8	5	16.0	0.8	5
- Sub-Canopy Layer	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																			
Average Score				5			5			5			5			5			5
4. Tree canopy cover (%):																			
- Canopy Layer	59	39.4	0.7	5	59.3	1.0	5	28.2	0.5	2	83.0	1.4	5	67.0	1.1	5	75.0	1.3	5
- Sub-Canopy Layer	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																			
Average Score				5			5			2			5			5			5
5. Native shrub canopy cover (%):	6	6.0	1.0	5	3.0	0.5	5	7.8	1.3	5	5.0	0.8	5	3.5	0.6	5	7.0	1.2	5
6. Native perennial grass cover (%):	25	50.0	2.0	5	81.0	3.2	5	50.0	2.0	5	47.0	1.9	5	40.0	1.6	5	22.0	0.9	3
7. Organic litter (%):	40	47.0	1.2	5	17.0	0.4	3	36.0	0.9	5	44.0	1.1	5	46.0	1.2	5	76.0	1.9	5
8. Large trees/ha																			
- Eucalypts	70	90.0			62.0			22.0			88.0			22.0			22.0		
- Non-eucalypts	21	32.0			6.0			4.0			0.0			0.0			12.0		
- Total	91	122.0	1.3	15	68.0	0.7	10	26.0	0.3	5	88.0	1.0	10	22.0	0.2	5	34.0	0.4	5
9. Coarse woody debris (m/ha):	400	513.0	1.3	5	193.0	0.5	2	138.0	0.3	2	267.0	0.7	5	220.0	0.6	5	420.0	1.1	5
10. Non-native plant cover (%):	0	2.0	2.0	10	5.0	0.0	10	0.0	0.0	10	5.0	5.0	5	5.0	5.0	5	5.0	5.0	5
Ecological Condition Indicator Score:				73			66			60			62			59			55
Site Condition Score	Max Score	80																	
1. Size of patch (Fragmented)	10			10.0			10.0			10.0			10.0			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			5.0			4.0			5.0			5.0
3. Context (Fragmented)	5			5.0			5.0			5.0			5.0			5.0			5.0
4. Distance from water (Intact)	NA			NA			NA			NA			NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0			6.0			6.0			6.0
Site Condition Score:				26.0			26.0			26.0			25.0			26.0			26.0
Species Habitat Index Score (Magnificent Brood Frog)	Max Score																		
1. Threats to species	15			7.0			7.0			7.0			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0			10.0			10.0			10.0
3. Quality and availability of shelter	10			5.0			5.0			5.0			5.0			5.0			5.0
4. Species mobility capacity	10			7.0			7.0			7.0			7.0			7.0			7.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0			4.0			4.0			4.0
Species Habitat Index Score:				33.0			33.0			33.0			33.0			33.0			33.0
Habitat Quality Score (measured):		132.00			125.00			119.00			120.00			118.00			114.00		
Average Habitat Quality Score (measured):		121.33																	
Assessment Unit Habitat Quality Score		7.78																	
Area (ha)		1.16																	
Weighted Habitat Quality Score		3.05																	
Final Impact Habitat Quality Score		7.52																	

		AU 2			AU 2			AU 2		
		Fragmented			Fragmented			Fragmented		
		HQ3			HQ205			HQ212		
	7.12.30 (Draft)* (Same BVG)	7.12.30a			7.12.30a			7.12.30a		
	10b	10b			10b			10b		
	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
	100	100.0	1.0	5	100	1.0	5	100.0	1.0	5
	5	3.0	0.6	3	6	1.2	5	5.0	1.0	5
	13	9.0	0.7	3	7	0.5	3	6.0	0.5	3
	7	10.0	1.4	5	4	0.6	3	4.0	0.6	3
	25	13.0	0.5	3	6	0.2	3	5.0	0.2	3
	17	16.0	0.9	5	21	1.2	5	16.2	1.0	5
	6	NA	NA	NA	14	2.3	5	6.8	1.1	5
				5			5			5
	55	16.3	0.3	2	30	0.5	5	79.0	1.4	5
	13	NA	NA	NA	16	1.2	5	3.0	0.2	2
				2			5			5
	7	5.0	0.7	5	4	0.6	5	2.0	0.3	3
	35	44.0	1.3	5	76	2.2	5	54.0	1.5	5
	17	46.0	2.7	3	22	1.3	5	38.0	2.2	3
	23	84.0			14			16.0		
	2	0.0			6			0.0		
	25	84.0	3.4	15	20.0	0.8	10	16.0	0.6	10
	290	383.0	1.3	5	490	1.7	5	450.0	1.6	5
	0	5.0	5.0	5	2	2.0	10	0.0	0.0	10
				64			69			65
	Max Score									
	10			10.0			10.0			10.0
	5			4.0			5.0			5.0
	5			5.0			5.0			5.0
	NA			NA			NA			NA
	6			6.0			6.0			6.0
				25.0			26.0			26.0
	Max Score									
	15			7.0			7.0			7.0
	10			10.0			10.0			10.0
	10			5.0			5.0			5.0
	10			7.0			7.0			7.0
	5			4.0			4.0			4.0
				33.0			33.0			33.0
		122.00			128.00			124.00		
		124.67								
		7.99								
		0.62								
		1.67								

		AU 3			AU 3			AU 3		
		Intact			Intact			Intact		
		HQ4			HQ5			HQ6		
	9.11.3a (same BVG)	9.12.30a			9.12.30a			9.12.30a		
	13a	13a			13a			13a		
	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
	100	100.0	1.0	5	100.0	1.0	5	100.0	1.0	5
	5	5.0	1.0	5	5.0	1.0	5	6.0	1.2	5
	7	10.0	1.4	5	10.0	1.4	5	7.0	1.0	5
	8	8.0	1.0	5	10.0	1.3	5	10.0	1.3	5
	8	8.0	1.0	5	7.0	0.9	3	8.0	1.0	5
	11	13.0	1.2	5	10.0	0.9	5	13.0	1.2	5
	5	NA	NA	NA	NA	NA	NA	NA	NA	NA
				5			5			5
	30	20.6	0.7	5	12.9	0.4	2	21.0	0.7	5
	2	NA	NA	NA	NA	NA	NA	NA	NA	NA
				5			2			5
	1	6.0	6.0	3	6.0	6.0	3	5.0	5.0	3
	30	23.0	0.8	3	60.0	2.0	5	54.0	1.8	5
	21	64.0	3.0	3	30.0	1.4	5	31.0	1.5	5
	18	26.0			8.0			44.0		
	10	2.0			2.0			4.0		
	28	28.0	1.0	10	10.0	0.4	5	48.0	1.7	15
	66	412.0	6.2	2	72.0	1.1	5	394.0	6.0	2
	0	2.0	2.0	10	0.0	0.0	10	1.0	1.0	10
				66			63			75
	Max Score									
	NA			NA			NA			NA
	NA			NA			NA			NA
	NA			NA			NA			NA
	20			0.0			2.0			5.0
	6			6.0			6.0			6.0
				6.0			8.0			11.0
	Max Score									
	15			7.0			7.0			7.0
	10			10.0			10.0			10.0
	10			5.0			5.0			5.0
	10			7.0			7.0			7.0
	5			4.0			4.0			4.0
				33.0			33.0			33.0
		105.00			104.00			119.00		
		109.33								
		7.01								
		1.18								
		2.79								

* Draft Benchmarks provided by the Queensland Herbarium

A.2 Magnificent Brood Frog Offset Site

Assessment Type (Impact Site / Offset Site):		AU 1			AU 1			AU 1			AU 1			AU 1			AU 1		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented		
Assessment Site No.:		HQ8			HQ13			HQ10			HQ15			BC114			BC113		
Regional Ecosystem:	7.12.27 (Draft)* (Same BVG)	7.12.27c			7.8.8b			7.12.27c			7.12.27a			7.12.27a			7.8.8b		
BVG1M:	9d	9d			9d			9d			9d			9d			9d		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	100.0	1.0	5	75.0	0.8	5	100.0	1.0	5	50.0	0.5	3	80.0	0.8	5	50.0	0.5	3
2. Native plant species richness (No.):																			
- Trees	5	4.0	0.8	3	5.0	1.0	5	6.0	1.2	5	6.0	1.2	5	5.0	1.0	5	6.0	1.2	5
- Shrubs	12	2.0	0.2	0	4.0	0.3	3	6.0	0.5	3	5.0	0.4	3	6.0	0.5	3	4.0	0.3	3
- Grasses	6	10.0	1.7	5	6.0	1.0	5	3.0	0.5	3	5.0	0.8	3	3.0	0.5	3	2.0	0.3	3
- Forbs	11	10.0	0.9	5	8.0	0.7	3	12.0	1.1	5	4.0	0.4	3	7.0	0.6	3	5.0	0.5	3
3. Tree canopy height (m):																			
- Canopy Layer	19	19.0	1.0	5	18.0	0.9	5	17.0	0.9	5	15.0	0.8	5	15.2	0.8	5	16.0	0.8	5
- Sub-Canopy Layer	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																			
Average Score				5			5			5			5			5			5
4. Tree canopy cover (%):																			
- Canopy Layer	59	39.4	0.7	5	59.3	1.0	5	28.2	0.5	2	83.0	1.4	5	67.0	1.1	5	75.0	1.3	5
- Sub-Canopy Layer	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																			
Average Score				5			5			2			5			5			5
5. Native shrub canopy cover (%):	6	6.0	1.0	5	3.0	0.5	5	7.8	1.3	5	5.0	0.8	5	3.5	0.6	5	7.0	1.2	5
6. Native perennial grass cover (%):	25	50.0	2.0	5	81.0	3.2	5	50.0	2.0	5	47.0	1.9	5	40.0	1.6	5	22.0	0.9	3
7. Organic litter (%):	40	47.0	1.2	5	17.0	0.4	3	36.0	0.9	5	44.0	1.1	5	46.0	1.2	5	76.0	1.9	5
8. Large trees/ha																			
- Eucalypts	70	90.0			62.0			22.0			88.0			22.0			22.0		
- Non-eucalypts	21	32.0			6.0			4.0			0.0			0.0			12.0		
- Total	91	122.0	1.3	15	68.0	0.7	10	26.0	0.3	5	88.0	1.0	10	22.0	0.2	5	34.0	0.4	5
9. Coarse woody debris (m/ha):	400	513.0	1.3	5	193.0	0.5	2	138.0	0.3	2	267.0	0.7	5	220.0	0.6	5	420.0	1.1	5
10. Non-native plant cover (%):	0	2.0	2.0	10	5.0	0.0	10	0.0	0.0	10	5.0	5.0	5	5.0	5.0	5	5.0	5.0	5
Ecological Condition Indicator Score:				73			66			60			62			59			55
Site Condition Score	Max Score	80																	
1. Size of patch (Fragmented)	10			10.0			10.0			10.0			10.0			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			5.0			4.0			5.0			5.0
3. Context (Fragmented)	5			5.0			5.0			5.0			5.0			5.0			5.0
4. Distance from water (Intact)	NA			NA			NA			NA			NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0			6.0			6.0			6.0
Site Condition Score:				26.0			26.0			26.0			25.0			26.0			26.0
Species Habitat Index Score (Magnificent Brood Frog)	Max Score																		
1. Threats to species	15			7.0			7.0			7.0			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0			10.0			10.0			10.0
3. Quality and availability of shelter	10			5.0			5.0			5.0			5.0			5.0			5.0
4. Species mobility capacity	10			7.0			7.0			7.0			7.0			7.0			7.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0			4.0			4.0			4.0
Species Habitat Index Score:				33.0			33.0			33.0			33.0			33.0			33.0
Habitat Quality Score (measured):		132.00			125.00			119.00			120.00			118.00			114.00		
Average Habitat Quality Score (measured):		121.33																	
Assessment Unit Habitat Quality Score		7.78																	
Area (ha)		1.16																	
Weighted Habitat Quality Score		3.05																	
Final Impact Habitat Quality Score		7.52																	

		AU 2			AU 2			AU 2		
		Fragmented			Fragmented			Fragmented		
		HQ3			HQ205			HQ212		
	7.12.30 (Draft)* (Same BVG)	7.12.30a			7.12.30a			7.12.30a		
	10b	10b			10b			10b		
	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
	100	100.0	1.0	5	100	1.0	5	100.0	1.0	5
	5	3.0	0.6	3	6	1.2	5	5.0	1.0	5
	13	9.0	0.7	3	7	0.5	3	6.0	0.5	3
	7	10.0	1.4	5	4	0.6	3	4.0	0.6	3
	25	13.0	0.5	3	6	0.2	3	5.0	0.2	3
	17	16.0	0.9	5	21	1.2	5	16.2	1.0	5
	6	NA	NA	NA	14	2.3	5	6.8	1.1	5
				5			5			5
	55	16.3	0.3	2	30	0.5	5	79.0	1.4	5
	13	NA	NA	NA	16	1.2	5	3.0	0.2	2
				2			5			5
	7	5.0	0.7	5	4	0.6	5	2.0	0.3	3
	35	44.0	1.3	5	76	2.2	5	54.0	1.5	5
	17	46.0	2.7	3	22	1.3	5	38.0	2.2	3
	23	84.0			14			16.0		
	2	0.0			6			0.0		
	25	84.0	3.4	15	20.0	0.8	10	16.0	0.6	10
	290	383.0	1.3	5	490	1.7	5	450.0	1.6	5
	0	5.0	5.0	5	2	2.0	10	0.0	0.0	10
				64			69			65
	Max Score									
	10			10.0			10.0			10.0
	5			4.0			5.0			5.0
	5			5.0			5.0			5.0
	NA			NA			NA			NA
	6			6.0			6.0			6.0
				25.0			26.0			26.0
	Max Score									
	15			7.0			7.0			7.0
	10			10.0			10.0			10.0
	10			5.0			5.0			5.0
	10			7.0			7.0			7.0
	5			4.0			4.0			4.0
				33.0			33.0			33.0
		122.00			128.00			124.00		
		124.67								
		7.99								
		0.62								
		1.67								

		AU 3			AU 3			AU 3		
		Intact			Intact			Intact		
		HQ4			HQ5			HQ6		
	9.11.3a (same BVG)	9.12.30a			9.12.30a			9.12.30a		
	13a	13a			13a			13a		
	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
	100	100.0	1.0	5	100.0	1.0	5	100.0	1.0	5
	5	5.0	1.0	5	5.0	1.0	5	6.0	1.2	5
	7	10.0	1.4	5	10.0	1.4	5	7.0	1.0	5
	8	8.0	1.0	5	10.0	1.3	5	10.0	1.3	5
	8	8.0	1.0	5	7.0	0.9	3	8.0	1.0	5
	11	13.0	1.2	5	10.0	0.9	5	13.0	1.2	5
	5	NA	NA	NA	NA	NA	NA	NA	NA	NA
				5			5			5
	30	20.6	0.7	5	12.9	0.4	2	21.0	0.7	5
	2	NA	NA	NA	NA	NA	NA	NA	NA	NA
				5			2			5
	1	6.0	6.0	3	6.0	6.0	3	5.0	5.0	3
	30	23.0	0.8	3	60.0	2.0	5	54.0	1.8	5
	21	64.0	3.0	3	30.0	1.4	5	31.0	1.5	5
	18	26.0			8.0			44.0		
	10	2.0			2.0			4.0		
	28	28.0	1.0	10	10.0	0.4	5	48.0	1.7	15
	66	412.0	6.2	2	72.0	1.1	5	394.0	6.0	2
	0	2.0	2.0	10	0.0	0.0	10	1.0	1.0	10
				66			63			75
	Max Score									
	NA			NA			NA			NA
	NA			NA			NA			NA
	NA			NA			NA			NA
	20			0.0			2.0			5.0
	6			6.0			6.0			6.0
				6.0			8.0			11.0
	Max Score									
	15			7.0			7.0			7.0
	10			10.0			10.0			10.0
	10			5.0			5.0			5.0
	10			7.0			7.0			7.0
	5			4.0			4.0			4.0
				33.0			33.0			33.0
		105.00			104.00			119.00		
		109.33								
		7.01								
		1.18								
		2.79								

* Draft Benchmarks provided by the Queensland Herbarium

A.3 Greater Glider Impact Site

Assessment Type (Impact Site / Offset Site):		AU 1			AU 1			AU 1			AU 1			AU 1			AU 1			AU 1				AU 2			AU 2			AU 2				AU 3			AU 3		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented							Fragmented			Fragmented							Fragmented			Fragmented		
Assessment Site No.:		HQ8			HQ13			HQ10			HQ15			BC114			BC101			BC113				HQ3			HQ205			HQ212					HQ16			BC115		
Regional Ecosystem:	7.12.27 (Draft)*	7.12.27c			7.8.8b			7.12.27c			7.12.27a			7.12.27a			7.12.34			7.8.8b			7.12.30 (Draft)*	7.12.30a			7.12.30a			7.12.30a			HQ16 considered Best on Offer	7.8.7a			7.8.7a		
BVG1M:	9d	9d			9d			9d			9d			9d			9d			9d			10b	10b			10b			10b			9c	9c			9c		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	100.0	1.0	5	75.0	0.8	5	100.0	1.0	5	50.0	0.5	3	80	0.8	5	75.0	0.8	5	50.0	0.5	3	100	100.0	1.0	5	100	1.0	5	100	1.0	5	100	100.0	1.0	5	100.0	1.0	5
2. Native plant species richness (No.):																																								
- Trees	5	4.0	0.8	3	5.0	1.0	5	6.0	1.2	5	6.0	1.2	5	5	1.0	5	6.0	1.2	5	6.0	1.2	5	5	3.0	0.6	3	6	1.2	5	5	1.0	5	4	4.0	1.0	5	3.0	0.8	3
- Shrubs	12	2.0	0.2	0	4.0	0.3	3	6.0	0.5	3	5.0	0.4	3	6	0.5	3	3.0	0.3	3	4.0	0.3	3	13	9.0	0.7	3	7	0.5	3	6	0.5	3	4	4.0	1.0	5	2.0	0.5	3
- Grasses	6	10.0	1.7	5	6.0	1.0	5	3.0	0.5	3	5.0	0.8	3	3	0.5	3	6.0	1.0	5	2.0	0.3	3	7	10.0	1.4	5	4	0.6	3	4	0.6	3	7	7.0	1.0	5	6.0	0.9	3
- Forbs	11	10.0	0.9	5	8.0	0.7	3	12.0	1.1	5	4.0	0.4	3	7	0.6	3	6.0	0.5	3	5.0	0.5	3	25	13.0	0.5	3	6	0.2	3	5	0.2	3	9	9.0	1.0	5	4.0	0.4	3
3. Tree canopy height (m):																																								
- Canopy Layer	19	19.0	1.0	5	18.0	0.9	5	17.0	0.9	5	15.0	0.8	5	15.2	0.8	5	16.4	0.9	5	16.0	0.8	5	17	16.0	0.9	5	21	1.2	5	16.2	1.0	5	18.4	18.4	1.0	5	20.5	1.1	5
- Sub-Canopy Layer	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6	NA	NA	NA	14	2.3	5	6.84	1.1	5	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																																								
Average Score				5			5			5			5			5			5			5			5			5			5					5			5
4. Tree canopy cover (%):																																								
- Canopy Layer	59	39.4	0.7	5	59.3	1.0	5	28.2	0.5	2	83.0	1.4	5	67	1.1	5	77.0	1.3	5	75.0	1.3	5	55	16.3	0.3	2	30	0.5	5	79	1.4	5	34.3	34.3	1.0	5	28.0	0.8	5
- Sub-Canopy Layer	21	0.0	0.0	0		0.0	0	0.0	0.0	0	0.0	0.0	0	0	0.0	0	0.0	0.0	0		0.0	0	13	0.0	0.0	0	16	1.2	5	3	0.2	2	0	NA	NA	NA	NA	NA	NA
- Emergent Layer																																								
Average Score				5			5			2			5			5			5			5			2			5			5					5			5
5. Native shrub canopy cover (%):	6	6.0	1.0	5	3.0	0.5	5	7.8	1.3	5	5.0	0.8	5	3.5	0.6	5	5.5	0.9	5	7.0	1.2	5	7	5.0	0.7	5	4	0.6	5	2	0.3	3	3	3.0	1.0	5	1.0	0.3	3
6. Native perennial grass cover (%):	25	50.0	2.0	5	81.0	3.2	5	50.0	2.0	5	47.0	1.9	5	40	1.6	5	63.0	2.5	5	22.0	0.9	3	35	44.0	1.3	5	76	2.2	5	54	1.5	5	65	65.0	1.0	5	52.0	0.8	3
7. Organic litter (%):	40	47.0	1.2	5	17.0	0.4	3	36.0	0.9	5	44.0	1.1	5	46	1.2	5	35.0	0.9	5	76.0	1.9	5	17	46.0	2.7	3	22	1.3	5	38	2.2	3	21	21.0	1.0	5	38.0	1.8	5
8. Large trees/ha																																								
- Eucalypts	70	90.0			62.0			22.0	0.3		88.0			22			32.0			22.0			23	84.0			14			16			52	52.0			16.0		
- Non-eucalypts	21	32.0			6.0			4.0	0.2		0.0			0			0.0			12.0			2	0.0			6			0			0	0.0			1.0		
- Total	91	122.0	1.3	15	68.0	0.7	10	26.0	0.3	5	88.0	1.0	10	22	0.2	5	32.0	0.4	5	34.0	0.4	5	25	84.0	3.4	15	20.0	0.8	10	16.0	0.6	10	52	52.0	1.0	10	17.0	0.3	5
9. Coarse woody debris (m/ha):	400	513.0	1.3	5	193.0	0.5	2	138.0	0.3	2	267.0	0.7	5	220	0.6	5	820.0	2.1	2	420.0	1.1	5	290	383.0	1.3	5	490	1.7	5	450.0	1.6	5	197	197.0	1.0	5	80.0	0.4	2
10. Non-native plant cover (%):	0	2.0	2.0	10	5.0	0.0	10	0.0	0.0	10	5.0	5.0	5	5	5.0	5	20.0	20.0	5	5.0	5.0	5	0	5.0	5.0	5	2	2.0	10	0	0.0	10	0	5.0	5.0	5	5.0	5.0	5
Ecological Condition Indicator Score:				73			66			60			62			59			58			55				64			69			65				70			50
Site Condition Score	Max Score																						Max Score										Max Score						
1. Size of patch (Fragmented)	10			10.0			10.0			10.0			10.0			10.0			10.0		10.0	10			10.0			10.0			10.0	10			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			5.0			4.0			5.0			4.0		5.0	5			4.0			5.0			5.0	5			5.0			5.0
3. Context (Fragmented)	5			5.0			5.0			5.0			5.0			5.0			5.0		5.0	5			5.0			5.0			5.0	5			5.0			5.0
4. Distance from water (Intact)	NA			NA			NA			NA			NA			NA			NA		NA	NA			NA			NA			NA	NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0			6.0			6.0			6.0		6.0	6			6.0			6.0			6.0	6			6.0			6.0
Site Condition Score:				26.0			26.0			26.0			25.0			26.0			25.0		26.0				25.0			26.0			26.0				26.0			26.0
Species Habitat Index Score (Greater Glider)	Max Score																						Max Score										Max Score						
1. Threats to species	15			7.0			7.0			7.0			7.0			7.0			7.0		7.0	15			7.0			7.0			7.0	15			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0			10.0			10.0			10.0		10.0	10			10.0			10.0			10.0	10			10.0			10.0
3. Quality and availability of shelter	10			10.0			10.0			10.0			10.0			10.0			10.0		10.0	10			10.0			10.0			10.0	10			10.0			10.0
4. Species mobility capacity	10			10.0			10.0			10.0			10.0			10.0			10.0		10.0	10			10.0			10.0			10.0	10			10.0			10.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0			4.0			4.0			4.0		4.0	5			4.0			4.0			4.0	5			4.0			4.0
Species Habitat Index Score:				41.0			41.0			41.0			41.0			41.0			41.0		41.0				41.0			41.0			41.0				41.0			41.0
Habitat Quality Score (measured):		140.00			133.00			127.00			128.00			126.00			124.00			122.00				130.00			136.00			132.00				137.00			117.00		
Average Habitat Quality Score (measured):		128.57																						130.00										127.00					
Assessment Unit Habitat Quality Score		8.24																						8.33										8.14					
Area (ha)		22.23																						38.93										0.03					
Weighted Habitat Quality Score		2.99																						5.30										0.00					
Final Impact Habitat Quality Score		8.30																																					

* Draft Benchmarks provided by the Queensland Herbarium

* Draft Benchmarks provided by the Queensland Herbarium

A.4 Greater Glider Offset Site

Assessment Type (Impact Site / Offset Site):		AU 1			AU 1			AU 1			AU 1			AU 1			AU 1			AU 1			AU 1			AU 1			AU 1			AU 1		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented		
Assessment Site No.:		BC111			BC112			BC125			HQ204			HQ206			HQ208			HQ221			HQ228			HQ203			HQ202			HQ201			HQ9		
Regional Ecosystem:	7.12.30 (Draft)*	7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.30a			7.12.27c			7.12.30a		
BVG1M:	10b	10b			10b			10b			10b			10b			10b			10b			10b			10b			10b			10b			10b		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	100.0	1.0	5	100.0	1.0	5	75.0	0.8	5	100	1.0	5	75	0.8	5	75	0.8	5	100	1.0	5	100	1.0	5	75	0.8	5	100	1.0	5	75	0.8	5	75	0.8	5
2. Native plant species richness (No.):																																					
- Trees	5	6.0	1.2	5	4.0	0.8	3	6.0	1.2	5	5	1.0	5	8	1.6	5	8	1.6	5	5	1.0	5	5	1.0	5	9	1.8	5	6	1.2	5	5	1.0	5	5	1.0	5
- Shrubs	13	4.0	0.3	3	3.0	0.2	3	6.0	0.5	3	8	0.6	3	7	0.5	3	5	0.4	3	6	0.5	3	5	0.4	3	6	0.5	3	7	0.5	3	7	0.5	3	2	0.2	0
- Grasses	7	5.0	0.7	3	4.0	0.6	3	4.0	0.6	3	6	0.9	3	3	0.4	3	5	0.7	3	4	0.6	3	4	0.6	3	6	0.9	3	3	0.4	3	2	0.3	3	6	0.9	3
- Forbs	25	4.0	0.2	0	4.0	0.2	0	6.0	0.2	3	5	0.2	3	7	0.3	3	5	0.2	3	6	0.2	3	6	0.2	3	6	0.2	3	5	0.2	3	3	0.1	0	9	0.4	3
3. Tree canopy height (m):																																					
- Canopy Layer	17	15.4	0.9	5	15.8	0.9	5	15.8	0.9	5	16.5	1.0	5	18.3	1.1	5	17.2	1.0	5	18	1.1	5	17.5	1.0	5	17.6	1.0	5	15.6	0.9	5	16.6	1.0	5	16	0.9	5
- Sub-Canopy Layer	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	7	1.2	5	8.4	1.4	5	7	1.2	5	7	1.2	5	7	1.2	5	8.2	1.4	5	6.6	1.1	5	8.2	1.4	5	NA	NA	NA
- Emergent Layer																																					
Average Score				5			5			5			5			5			5			5			5			5			5			3			5
4. Tree canopy cover (%):																																					
- Canopy Layer	55	75.0	1.4	5	67.0	1.2	5	43.0	0.8	5	61	1.1	5	78	1.4	5	61	1.1	5	94	1.7	5	81	1.5	5	41	0.7	5	55	1.0	5	71	1.3	5	25.6	0.5	2
- Sub-Canopy Layer	13	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	7	0.5	5	4	0.3	2	12	0.9	5	5	0.4	2	21	1.6	5	9	0.7	5	24	1.8	5	61	4.7	3	0	0.0	0
- Emergent Layer																																					
Average Score				5			5			5			5			5			5			5			5			5			5			3			2
5. Native shrub canopy cover (%):	7	0.0	0.0	0	1.5	0.2	3	10.0	1.4	5	2	0.3	3	1	0.1	3	2	0.3	3	1	0.1	3	3	0.4	3	5	0.7	5	7	1.0	5	4	0.6	5	6.8	1.0	5
6. Native perennial grass cover (%):	35	71.0	2.0	5	79.0	2.3	5	73.0	2.1	5	76	2.2	5	84	2.4	5	38	1.1	5	18	0.5	3	40	1.1	5	80	2.3	5	40	1.1	5	5	0.1	1	60	1.7	5
7. Organic litter (%):	17	23.0	1.4	5	21.0	1.2	5	23.0	1.4	5	20	1.2	5	12	0.7	5	62	3.6	3	52	3.1	3	48	2.8	3	18	1.1	5	48	2.8	3	86	5.1	3	34	2.0	5
8. Large trees/ha																																					
- Eucalypts	23	46.0			4.0			14.0			16			26			24			22			16			6			14			86			52		
- Non-eucalypts	2	0.0			0.0			0.0			0			4			0			0			4			4			2			48			4		
- Total	25	46.0	1.8	15	4.0	0.2	5	14.0	0.6	10	16.0	0.6	10	30.0	1.2	15	24.0	1.0	10	22	0.9	10	20.0	0.8	10	10	0.4	5	16	0.6	10	134	5.4	15	56	2.2	15
9. Coarse woody debris (m/ha):	290	200.0	0.7	5	220.0	0.8	5	200.0	0.7	5	330	1.1	5	150	0.5	5	140	0.5	2	420	1.4	5	420	1.4	5	370	1.3	5	220	0.8	5	645	2.2	2	151	0.5	5
10. Non-native plant cover (%):	0	15.0	15.0	5	10.0	10.0	5	10.0	10.0	5	2	2.0	10	5	5.0	5	25	25.0	3	2	2.0	10	2	2.0	10	5	5.0	5	0	0.0	10	1	1.0	10	0	0.0	10
Ecological Condition Indicator Score:				61			52			64			67			67			55			63			65			59			67			58			68
Site Condition Score	Max Score																																				
1. Size of patch (Fragmented)	10			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			5.0			5.0			4.0			4.0			5.0			5.0			5.0			5.0			5.0			5.0
3. Context (Fragmented)	5			5.0			5.0			5.0			5.0			5.0			5.0			5.0			5.0			5.0			5.0			5.0			5.0
4. Distance from water (Intact)	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0			6.0			6.0			6.0			6.0			6.0			6.0			6.0			6.0			6.0
Site Condition Score:				26.0			26.0			26.0			26.0			25.0			25.0			26.0			26.0			26.0			26.0			26.0			26.0
Species Habitat Index Score	Max Score																																				
1. Threats to species	15			7.0			7.0			7.0			7.0			7.0			7.0			7.0			7.0			7.0			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0
3. Quality and availability of shelter	10			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0
4. Species mobility capacity	10			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0			10.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0			4.0			4.0			4.0			4.0			4.0			4.0			4.0			4.0			4.0
Species Habitat Index Score:				41.0			41.0			41.0			41.0			41.0			41.0			41.0			41.0			41.0			41.0			41.0			41.0
Habitat Quality Score (measured):		128.00			119.00			131.00			134.00			133.00			121.00			130.00			132.00			126.00			134.00			125.00			135.00		
Average Habitat Quality Score (measured):		129.00																																			
Assessment Unit Habitat Quality Score		8.27																																			
Area (ha)		152.1																																			
Weighted Habitat Quality Score		4.17																																			
Final Offset Habitat Quality Score																																					

* Draft Benchmarks provided by the Queensland Herbarium

Assessment Type (Impact Site / Offset Site):		AU 2			AU 2			AU 2			AU 2		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented			Fragmented		
Assessment Site No.:		HQ207			HQ12			HQ213			HQ216		
Regional Ecosystem:	7.12.27 (Draft)* (Same BVG)	7.12.27a			7.12.34			7.8.8b			7.8.8b		
BVG1M:	9d	9d			9d			9d			9d		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	100.0	1.0	5	100.0	1.0	5	100	1.0	5	66	0.7	3
2. Native plant species richness (No.):													
- Trees	5	7.0	1.4	5	5.0	1.0	5	4	0.8	3	4	0.8	3
- Shrubs	12	8.0	0.7	3	2.0	0.2	0	7	0.6	3	5	0.4	3
- Grasses	6	4.0	0.7	3	7.0	1.2	5	3	0.5	3	2	0.3	3
- Forbs	11	6.0	0.5	3	7.0	0.6	3	4	0.4	3	3	0.3	3
3. Tree canopy height (m):													
- Canopy Layer	19	15.6	0.8	5	20.0	1.1	5	19.6	1.0	5	19.2	1.0	5
- Sub-Canopy Layer	8	9.5	1.2	5	NA	NA	NA	7	0.9	5	9.6	1.2	5
- Emergent Layer													
Average Score				5			5			5			5
4. Tree canopy cover (%):													
- Canopy Layer	59	64.0	1.1	5	53.1	0.9	5	82	1.4	5	65	1.1	5
- Sub-Canopy Layer	21	21.0	1.0	5	NA	NA	NA	16	0.8	5	39	1.9	5
- Emergent Layer													
Average Score				5			5			5			5
5. Native shrub canopy cover (%):	6	9.0	1.5	5	3.0	0.5	5	3	0.5	5	5	0.8	5
6. Native perennial grass cover (%):	25	60.0	2.4	5	64.0	2.6	5	18	0.7	3	2	0.1	0
7. Organic litter (%):	40	26.0	0.7	5	28.0	0.7	5	56	1.4	5	76	1.9	5
8. Large trees/ha													
- Eucalypts	70	26.0			60.0			38			22		
- Non-eucalypts	21	20.0			0.0			0			16		
- Total	91	46.0	0.5	10	60.0	0.7	10	38	0.4	5	38	0.4	5
9. Coarse woody debris (m/ha):	400	230.0	0.6	5	326.0	0.8	5	110	0.3	2	100	0.3	2
10. Non-native plant cover (%):	0	2.0	2.0	10	20.0	20.0	5	40	40.0	3	10	10.0	5
Ecological Condition Indicator Score:				69			63			50			47
Site Condition Score	Max Score												
1. Size of patch (Fragmented)	10			10.0			10.0			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			4.0			4.0
3. Context (Fragmented)	5			5.0			5.0			4.0			4.0
4. Distance from water (Intact)	NA			NA			NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0			6.0
Site Condition Score:				26.0			26.0			24.0			24.0
Species Habitat Index Score	Max Score												
1. Threats to species	15			7.0			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0			10.0
3. Quality and availability of shelter	10			10.0			10.0			10.0			10.0
4. Species mobility capacity	10			10.0			10.0			10.0			10.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0			4.0
Species Habitat Index Score:				41.0			41.0			41.0			41.0
Habitat Quality Score (measured):		136.00			130.00			115.00			112.00		
Average Habitat Quality Score (measured):		123.25											
Assessment Unit Habitat Quality Score		7.90											
Area (ha)		41.8											
Weighted Habitat Quality Score		1.10											
Final Offset Habitat Quality Score		8.12											

Assessment Type (Impact Site / Offset Site):		AU 3			AU 3		
Fragmented/Intact Subregion		Fragmented			Fragmented		
Assessment Site No.:		BC120			BC121		
Regional Ecosystem:	9.3.15 (Draft)* Same BVG	7.3.26a			7.3.26a		
BVG1M:	16a	16a			16a		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	60.0	0.6	3	60.0	0.6	3
2. Native plant species richness (No.):							
- Trees	5	5.0	1.0	5	6.0	1.2	5
- Shrubs	3	5.0	1.7	5	1.0	0.3	3
- Grasses	6	4.0	0.7	3	4.0	0.7	3
- Forbs	9	7.0	0.8	3	9.0	1.0	5
3. Tree canopy height (m):							
- Canopy Layer	27	18.0	0.7	3	17.4	0.6	3
- Sub-Canopy Layer	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer							
Average Score				3			3
4. Tree canopy cover (%):							
- Canopy Layer	31	72.0	2.3	3	84.0	2.7	3
- Sub-Canopy Layer	2	NA	NA	NA	NA	NA	NA
- Emergent Layer							
Average Score				3			3
5. Native shrub canopy cover (%):	2	22.0	11.0	3	26.0	13.0	3
6. Native perennial grass cover (%):	5	22.0	4.4	5	80.0	16.0	5
7. Organic litter (%):	17	39.0	2.3	3	4.0	0.2	3
8. Large trees/ha							
- Eucalypts	20						
- Non-eucalypts	80						
- Total	100	0.0	0.0	0	0.0	0.0	0
9. Coarse woody debris (m/ha):	21	120.0	5.7	2	140.0	6.7	2
10. Non-native plant cover (%):	0		0.0	10		0.0	10
Ecological Condition Indicator Score:				48			48
Site Condition Score	Max Score						
1. Size of patch (Fragmented)	10			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0
3. Context (Fragmented)	5			5.0			5.0
4. Distance from water (Intact)	NA			NA			NA
5. Ecological Corridors	6			6.0			6.0
Site Condition Score:				26.0			26.0
Species Habitat Index Score	Max Score						
1. Threats to species	15			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0
3. Quality and availability of shelter	10			10.0			10.0
4. Species mobility capacity	10			10.0			10.0
5. Role of site location to species overall population in the state	5			4.0			4.0
Species Habitat Index Score:				41.0			41.0
Habitat Quality Score (measured):		115.00			115.00		
Average Habitat Quality Score (measured):		115.00					
Assessment Unit Habitat Quality Score		7.37					
Area (ha)		0.6					
Weighted Habitat Quality Score		0.01					

Assessment Type (Impact Site / Offset Site):		AU 4			AU 4			AU 4		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented		
Assessment Site No.:		HQ218			HQ219			HQ227		
Regional Ecosystem:	HQ218 considered Best on Offer	7.8.16a			7.8.16a			7.8.16a		
BVG1M:	8a	8a			8a			8a		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	66	0.7	3	100	1.0	5	66	0.7	3
2. Native plant species richness (No.):										
- Trees	5	5	1.0	5	3	0.6	3	6	1.2	5
- Shrubs	4	4	1.0	5	4	1.0	5	6	1.5	5
- Grasses	5	5	1.0	5	4	0.8	3	3	0.6	3
- Forbs	6	6	1.0	5	4	0.7	3	5	0.8	3
3. Tree canopy height (m):										
- Canopy Layer	21.3	21.3	1.0	5	21	1.0	5	19.1	0.9	5
- Sub-Canopy Layer	7.8	7.8	1.0	5	8	1.0	5	7.3	0.9	5
- Emergent Layer										
Average Score				4			4			4
4. Tree canopy cover (%):										
- Canopy Layer	65	65	1.0	5	82	1.3	5	58	0.9	5
- Sub-Canopy Layer	8	8	1.0	5	0	0.0	0	85	10.6	3
- Emergent Layer										
Average Score				3			1.5			4
5. Native shrub canopy cover (%):	2	2	1.0	5	0	0.0	0	11	5.5	3
6. Native perennial grass cover (%):	20	20	1.0	5	12	0.6	3	26	1.3	5
7. Organic litter (%):	62	62	1.0	5	54	0.9	5	74	1.2	5
8. Large trees/ha										
- Eucalypts	18	18			38			12		
- Non-eucalypts	0	0			0			24		
- Total	18	18.0	1.0	10	38.0	2.1	15	36.0	2.0	15
9. Coarse woody debris (m/ha):	280	280	1.0	5	330	1.2	5	460	1.6	5
10. Non-native plant cover (%):	0	2	2.0	10	2	2.0	10	5	5.0	5
Ecological Condition Indicator Score:				70			62.5			65
Site Condition Score	Max Score									
1. Size of patch (Fragmented)	10			10.0			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			5.0
3. Context (Fragmented)	5			4.0			4.0			4.0
4. Distance from water (Intact)	NA			NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0
Site Condition Score:				25.0			25.0			25.0
Species Habitat Index Score	Max Score									
1. Threats to species	15			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0
3. Quality and availability of shelter	10			10.0			10.0			10.0
4. Species mobility capacity	10			10.0			10.0			10.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0
Species Habitat Index Score:				41.0			41.0			41.0
Habitat Quality Score (measured):		136.00			128.50			131.00		
Average Habitat Quality Score (measured):		131.83								
Assessment Unit Habitat Quality Score		8.45								
Area (ha)		57.9								
Weighted Habitat Quality Score		1.62								

Assessment Type (Impact Site / Offset Site):		AU 5			AU 5			AU 5			AU 5			AU 5			AU 5		
Fragmented/Intact Subregion		Fragmented			Fragmented			Fragmented			Fragmented			Fragmented			Fragmented		
Assessment Site No.:		HQ217			HQ226			HQ214			HQ215			HQ222			HQ229		
Regional Ecosystem:	HQ16 considered Best on Offer (same BVG)	7.8.18c			7.8.18c			7.8.8a			7.8.8a			7.8.8a			7.8.8a		
BVG1M:	9c	9c			9c			9c			9c			9c			9c		
Ecological Condition Indicator	Benchmark	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score	Value	% of Bench.	Score
1. Recruitment of woody perennial species (%)	100	75	0.8	5	66	0.7	3	66	0.7	3	75	0.8	5	100	1.0	5	100	1.0	5
2. Native plant species richness (No.):																			
- Trees	4	7	1.8	5	4	1.0	5	6	1.5	5	5	1.3	5	6	1.5	5	4	1.0	5
- Shrubs	4	5	1.3	5	4	1.0	5	5	1.3	5	4	1.0	5	5	1.3	5	6	1.5	5
- Grasses	7	3	0.4	3	4	0.6	3	2	0.3	3	2	0.3	3	3	0.4	3	3	0.4	3
- Forbs	9	4	0.4	3	10	1.1	5	3	0.3	3	5	0.6	3	4	0.4	3	4	0.4	3
3. Tree canopy height (m):																			
- Canopy Layer	18.4	18.2	1.0	5	17.2	0.9	5	16.8	0.9	5	22.3	1.2	5	19.2	1.0	5	18.4	1.0	5
- Sub-Canopy Layer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																			
Average Score				3			3			5			5			5			5
4. Tree canopy cover (%):																			
- Canopy Layer	34.3	69	2.0	3	77	2.2	3	81	2.4	3	77	2.2	3	76	2.2	3	37	1.1	5
- Sub-Canopy Layer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
- Emergent Layer																			
Average Score				3			3			3			3			3			5
5. Native shrub canopy cover (%):	3	7	2.3	3	8	2.7	3	7	2.3	3	0	0.0	0	7	2.3	3	2	0.7	5
6. Native perennial grass cover (%):	65	4	0.1	0	16	0.2	1	0	0.0	0	0	0.0	0	20	0.3	1	38	0.6	3
7. Organic litter (%):	21	82	3.9	3	74	3.5	3	50	2.4	3	68	3.2	3	66	3.1	3	40	1.9	5
8. Large trees/ha																			
- Eucalypts	52	16			14			16			38			16			18		
- Non-eucalypts	0	28			24			0			2			26			14		
- Total	52	44	0.8	10		0.0	0	16.0	0.3	5	40.0	0.8	10	42.0	0.8	10	32.0	0.6	10
9. Coarse woody debris (m/ha):	197	270	1.4	5	50	0.3	2	380	1.9	5	330	1.7	5	200	1.0	5	60	0.3	2
10. Non-native plant cover (%):	0	20	20.0	5	15	15.0	5	70	70.0	0	40	40.0	3	15	15.0	5	7	7.0	5
Ecological Condition Indicator Score:				53			41			43			50			56			61
Site Condition Score	Max Score																		
1. Size of patch (Fragmented)	10			10.0			10.0			10.0			10.0			10.0			10.0
2. Connectedness (Fragmented)	5			5.0			5.0			4.0			4.0			4.0			4.0
3. Context (Fragmented)	5			4.0			4.0			4.0			4.0			5.0			5.0
4. Distance from water (Intact)	NA			NA			NA			NA			NA			NA			NA
5. Ecological Corridors	6			6.0			6.0			6.0			6.0			6.0			6.0
Site Condition Score:				25.0			25.0			24.0			24.0			25.0			25.0
Species Habitat Index Score	Max Score																		
1. Threats to species	15			7.0			7.0			7.0			7.0			7.0			7.0
2. Quality and availability of food and foraging habitat	10			10.0			10.0			10.0			10.0			10.0			10.0
3. Quality and availability of shelter	10			10.0			10.0			10.0			10.0			10.0			10.0
4. Species mobility capacity	10			10.0			10.0			10.0			10.0			10.0			10.0
5. Role of site location to species overall population in the state	5			4.0			4.0			4.0			4.0			4.0			4.0
Species Habitat Index Score:				41.0			41.0			41.0			41.0			41.0			41.0
Habitat Quality Score (measured):		119.00			107.00			108.00			115.00			122.00			127.00		
Average Habitat Quality Score (measured):		116.33																	
Assessment Unit Habitat Quality Score		7.46																	
Area (ha)		49.0																	
Weighted Habitat Quality Score		1.21																	
Final Offset Habitat Quality Score																			

Appendix B EPBC Act Offset Assessment Guide

B.1 Magnificent Brood Frog

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Magnificent brood frog (Pseudophryne
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Direct impacts comprise habitat removal and potential mortality of individuals. Potential indirect impacts include habitat degradation by erosion and sedimentation.	**Area**	3	Hectares	RFI-Ecological Assessment Report (E2M, 2019)
			Quality	**8**	Scale 0-10	
			Total quantum of impact	2.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	2.40	Adjusted hectares	16.3	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	16.3	**Risk of loss (%) without offset**	2%	**Risk of loss (%) with offset**	0%	0.28	80%	0.22	0.22	2.68	111.87%	Yes	
									Future area without offset (adjusted hectares)	16.0	**Future area with offset (adjusted hectares)**	16.3								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**7**	**Future quality without offset (scale of 0-10)**	**6**	**Future quality with offset (scale of 0-10)**	**8**	2.00	80%	1.60	1.57				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

B.2 Greater Glider

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

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

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Direct impacts comprise habitat removal and potential mortality of individuals. Potential indirect impacts include habitat degradation by erosion and sedimentation.	**Area**	61.2	Hectares	RFI-Ecological Assessment Report (E2M, 2019)
			Quality	**8**	Scale 0-10	
			Total quantum of impact	48.96	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	48.96	Adjusted hectares	301.4	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	301.4	**Risk of loss (%) without offset**	2%	**Risk of loss (%) with offset**	0%	5.18	80%	4.15	3.98	50.04	102.21%	Yes	
									Future area without offset (adjusted hectares)	296.2	**Future area with offset (adjusted hectares)**	301.4								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**8**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**9**	2.00	80%	1.60	1.57				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Appendix C Additional Offset Areas

Appendix D Risk of Loss Assessment

27 November 2019

Neoen Australia c/o AECOM Australia Pty Ltd
Level 8, 540 Wickham Street,
Fortitude Valley, QLD 4006

KABAN GREEN POWER HUB OFFSET AREA MANAGEMENT PLAN: RISK OF LOSS – SPATIAL ANALYSIS

Introduction

E2M Pty Ltd (E2M) has been commissioned by AECOM Australia Pty Ltd (AECOM) on behalf of Neoen Australia Pty Ltd (Neoen) to identify suitable offsets to acquit the Kaban Green Power Hub's (herein referred to as 'the project') offsets obligations under the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offset Policy* (herein referred to as 'the policy'). In accordance with the policy, the project's ability to acquit its offset obligations was determined using the Department of Environment and Energy (DEE) Offsets Assessment Guide (Department of Environment and Energy 2012).

An integral variable in the Offsets Assessment Guide is the *Risk of Loss* percentage. *Risk of Loss* is identified by the DEE as the "*the chance that the habitat on the proposed offset site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future*" (Department of Environment and Energy 2018).

E2M received advice that the DEE base their *Risk of Loss* on the "*Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act*" document (herein referred to as 'the guidance document') (National Environmental Science Programme 2017). The guidance document outlines a proposed methodology for calculating the background rate of loss that can be used to estimate *Risk of Loss*. This background rate of loss is calculated using:

- remote sensing (Landsat imagery)
- the national land use dataset (Australian Bureau of Agricultural and Resource Economics (ABARES) 2010); and
- local government areas (LGA), where each LGA is given a rate of loss.

The project is located within is the Tablelands Regional Council (TRC) LGA. The guidance document prescribes a *Risk of Loss* value of 0.44% for the TRC LGA (itemised in Appendix 1 of the guidance document).

Review of this information has identified that a more accurate *Risk of Loss* factor may be able to be utilised for the project as the TRC was de-amalgamated in 2014. The de-amalgamation resulted in the Mareeba Shire Council (MSC) and Tableland Regional Council being created.

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E2M is of the opinion that the prescribed *Risk of Loss* value of 0.44% nominated in the guidance document does not accurately represent the proposed offset site. This is primarily due to land use and vegetation extent differences which were otherwise homogenised when the two councils were amalgamated. Following the de-amalgamation, a more specific assessment can be undertaken to conclude a result which is specific to the now de-amalgamated Tableland Regional Council (current TRC).

Aim

The aim of this document is to present a justification for the *Risk of Loss* concluded for the project by articulating the methodology utilised to recalculate the rate of loss for the current TRC and the potential *Risk of Loss* (over 20 years %). The methodology utilised for this assessment is based on publicly available data sets and the methods prescribed in the guidance document.

The guidance document *Risk of Loss* Methodology

The guidance document outlines the method to creating a background rate of loss as follows:

- Determine forest extent (primary vegetation) in 1972 using Landsat imagery
- Determine where regrowth occurred and exclude regrowth from calculations
- Determine the amount of primary vegetation cleared for each year
- Divide data into LGAs across Australia
- Calculate the background rate of loss as primary vegetation cleared/total amount of primary vegetation within that LGA per year; and
- Determine the average background rate of loss across the 10 years (2005-2014) and multiply this by 20 to get the 20 year *Risk of Loss* (National Environmental Science Programme 2017).

E2M adapted *Risk of Loss* Methodology

Specific to Queensland, the Department of Environment and Science captures land clearing annually through 'The Statewide Landcover and Trees Study' (SLATS) reporting mechanism (Department of Environment and Science 2018). The SLATS process is outlined below:

- Landsat imagery is acquired, corrected for topographic effects and sun and sensor viewing angles, and the most cloud-free images from the dry season images are selected.
- A woody vegetation clearing index is calculated, to detect areas of change which represent possible clearing of woody vegetation. This model has been calibrated using historic mapping of cleared areas and highlights all the possible clearing and omits areas which are almost certain not to represent clearing.
- This initial clearing index is visually inspected, and manually edited by trained remote sensing scientists to confirm areas which are clearing and remove areas which are not. This manual process makes use of any additional information available to aid decisions, for example, high resolution satellite imagery and aerial photography sourced via online image services.
- Senior SLATS remote sensing scientists review the manual editing, so that mapped clearing is further visually checked and verified.
- Further edits and quality control checks are undertaken to finalise the woody vegetation clearing mapping (Department of Environment and Science 2018)

The SLATS methodology has been subject to international peer-review and publication in scientific journals or conferences (Department of Environment and Science 2018). This rigour has resulted in the methodology being adapted and endorsed by other states and territories in Australia (Queensland Government 2017).

Due to the rigour of this process, the SLATS data was incorporated into the analysis rather than re-analyse the Landsat imagery as per the guidance document. This decision resulted in change to methodology, such that the guidance document method was used to guide this updated process.

The guidance document utilised the national land use dataset (ABARES 2010). However, due to the currency of this data, it was decided to use more recent Queensland Land Use Mapping Program (QLUMP) data. QLUMP is part of the Australian Collaborative Land Use and Management (ACLUMP), which is coordinated by ABARES, which published the national dataset in 2010.

The Biogeographic sub regions dataset was added to the analysis to create a finer resolution that was more relevant to the climatic, landform, geological, topographical, vegetation and biota patterns on the site, rather than the entire current TRC extent. The two sub-regions that intersect the site are:

- Atherton sub-region; and
- Herbert-Wairuna sub-region.

The datasets used in this analysis were:

- SLATS data from 1999-2017
- Landsat Woody Vegetation Extent - Queensland 2014
- QLUMP data for the Burdekin region (2016), Northern Gulf region (2015) and Wet Tropics region (2015)
- LGA boundaries (2019); and
- Biogeographic sub regions (2010).

All the datasets were downloaded from the Queensland Spatial Catalogue and are available to the public.

The process for creating the background rate of loss and *Risk of Loss* is outlined below:

- Create a woody vegetation baseline. The 'Landsat Woody Vegetation Extent' was vectorized and the non-woody vegetation removed. The SLATS data from 1999 – 2014 (excluding natural causes of clearing e.g. natural disasters) was merged with the vectorized woody vegetation dataset to create the 1999 baseline woody vegetation dataset.
- Create combined clearing dataset. The 2000-2017 SLATS datasets were merged to create a combined clearing dataset, with natural causes of clearing removed. This combined clearing dataset was then dissolved to remove any duplicate geometries.
- Create merged QLUMP dataset that covers the current TRC LGA. The three QLUMP datasets identified above were combined to create a single land use dataset, with all the secondary land uses merged. This was used to exclude waterbodies, forestry and nature conservation areas as per the guidance document.
- Create 'current TRC background rate of loss'. Combine current TRC LGA, Biogeographic sub regions dataset, merged QLUMP, woody vegetation baseline and combined clearing dataset. This dataset represented the total effect of clearing on the current TRC LGA from 2000-2017.
- Calculate background rate of loss and Risk of Loss.

Risk of Loss Analysis

The analysis of the current Tablelands background rate of loss dataset is represented in Table 1.

Table 1 current TRC background rate of loss and Risk of Loss

Biogeographic Sub Region	Total Area (ha)	Cleared Area (ha)	20 Year Risk of Loss (%)
Atherton	85857.81	995.34	1.36
Bellenden Ker - Lamb	20572.32	340.16	1.95
Broken River	303.20	0.00	0.00
Herberton - Wairuna	363355.62	6449.85	2.09
Hodgkinson Basin	2619.54	26.36	1.18
Innisfail	77.93	0.00	0.00
Kidston	24403.54	191.55	0.92
Kirrama - Hinchinbrook	60693.80	182.57	0.35
Paluma - Seaview	7.63	0.00	0.00
Undara - Toomba Basalts	181212.62	299.21	0.19

The two biogeographic sub regions that intersect the project, 'Atherton' and 'Herberton – Wairuna', have a *Risk of Loss of* 1.36% and 2.09% respectively. This results in an average *Risk of Loss* across the site of 1.73%. This is an increase in the *Risk of Loss* of 1.29% from the original calculation (0.44%) provided in Appendix 1 of the guidance document.

Conclusion / Recommendation

This assessment concluded that the background rate of loss used in the guidance document is underestimation for the offset site, since the analysis was undertaken prior to the de-amalgamation of the current Mareeba Shire Council and Tablelands Regional Council LGAs. Based on the analysis undertaken as part of this assessment an accurate *Risk of Loss* for the project is considered to be 1.73%.

If you have any queries regarding this advice, please contact me on 0419 333 469.

Kind regards,

Cameron Davey
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References

Australian Bureau of Agricultural and Resource Economics. (2010) *Land Use of Australia, Version 4, 2005/2006*.

Department of Environment and Energy. (2012) *Offsets Assessment Guide*. Commonwealth of Australia, Canberra.

Department of Environment and Energy. (2018) *How to Use the Offsets Assessment Guide*.

Department of Environment and Science. (2018) *Statewide Landcover and Trees Study (SLATS): Overview of Methods*.

National Environmental Science Programme. (2017) *Guide for Deriving 'Risk of Loss" Estimates When Evaluating Biodiversity Offset Proposals under the EPBC Act*.

Queensland Government. (2017) SLATS explained, https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/slats/slats-explained

Appendix E EPBC Approval Conditions

Australian Government
Department of Agriculture, Water and the Environment

APPROVAL

Kaban Green Power Hub, Kaban, Queensland (EPBC 2018/8289)

This decision is made under sections 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth).* Note that section 134(1A) of the **EPBC Act** applies to this approval, which provides in general terms that if the approval holder authorises another person to undertake any part of the action, the approval holder must take all reasonable steps to ensure that the other person is informed of any conditions attached to this approval, and that the other person complies with any such condition.

Details

Person to whom the approval is granted (approval holder)	Neoen Australia Pty. Ltd.
ABN of approval holder	ABN 57 160 905 706
Action	To construct and operate a wind farm with up to 29 turbines and associated infrastructure 80 km south-west of Cairns, in Kaban, far north Queensland; as described in the referral received by the Department on 17 October 2018 [See EPBC Act referral 2018/8289].

Approval decision

My decisions on whether or not to approve the taking of the action for the purposes of each controlling provision for the action are as follows.

Controlling Provisions

Listed Threatened Species and Communities	
Section 18	Approve
Section 18A	Approve

Listed migratory species	
Section 20	Approve
Section 20A	Approve

Period for which the approval has effect

This approval has effect until 3 April 2051.

Decision-maker

Name and position	Andrew McNee Assistant Secretary Assessments and Governance Branch Department of Agriculture, Water and the Environment
Signature	
Date of decision	21 April 2020

Conditions of approval

This approval is subject to the conditions under the EPBC Act as set out in ANNEXURE A.

ANNEXURE A – CONDITIONS OF APPROVAL

Part A – Conditions specific to the action

Maximum clearing limits

1. To minimise impacts on **EPBC Act listed threatened species and communities**, the approval holder must not **clear** more than 129 hectares (ha) of habitat for **EPBC Act listed threatened species and communities** within the **project area**, including no more than:

    (a) 95.2 ha of **Prostanthera habitat**.

    (b) 3 ha of **Magnificent Brood Frog habitat**.

    (c) 61.2 ha of **Greater Glider habitat**.

    (d) 100 ha of **Northern Quoll habitat**, including no more than 5.6 ha of **Northern Quoll denning habitat**.

EPBC Act listed threatened and migratory species management

2. The approval holder must implement the **Vegetation Management Plan** and **Fauna Management Plan** for the duration of this approval.

3. The approval holder must report against each performance criterion specified in the **Vegetation Management Plan** and **Fauna Management Plan** and provide an evaluation of the effectiveness of the measures implemented to avoid and mitigate impacts of the action on **EPBC Act listed threatened species and communities** and **EPBC Act listed migratory species** in each annual **compliance report** required under condition 35.

4. To minimise **impacts** on *Prostanthera clotteniana*, the approval holder must undertake **pre-clearance surveys** of all potential **Prostanthera habitat**. The approval holder must prevent any direct or indirect impacts to any Prostanthera clotteniana individual.

Turbine strike monitoring and management

5. During **operation**, the approval holder must implement the **Bird and Bat Management Plan**.

6. To inform the **risk profile** of each turbine, the approval holder must undertake bird and bat utilisation surveys, including:

    (a) Prior to **commissioning**, the approval holder must undertake pre-commissioning bird and bat utilisation surveys over a period of at least 24 months, including at least one survey undertaken at or adjacent to each proposed wind turbine location in each of at least one wet season and one dry season in succession.

    (b) Commencing within 3 months after **commissioning**, the approval holder must undertake post-commissioning bird and bat utilisation surveys over a period of at least 24 months, including at least one survey at or adjacent to each wind turbine in each of at least two wet seasons and two dry seasons in succession.

7. At least one survey in each 12 month period of bird and bat utilisation surveys required under condition 6 must be conducted within the **migratory period** of each **EPBC Act listed migratory species**.

8. The approval holder must report on the results of the bird and bat utilisation surveys required under condition 6 in each annual **compliance report** required under condition 35 until all bird and bat utilisation surveys have been reported on.

9. All bird and bat utilisation surveys must be conducted by a **suitably qualified ecologist**.

10. Prior to **commissioning**, the approval holder must assign a **risk profile** to each turbine within the **project area** using the results of the pre-commissioning bird and bat utilisation surveys required under condition 6(a).

11. If, during bird and bat utilisation surveys required under condition 6 or during any other monitoring or incidental observation during **operation,** one or more individual of an **EPBC Act listed bird or bat species** is detected within the **vicinity** of a **low-risk turbine**, the approval holder must assign that turbine to be a **high-risk turbine** within five **business days** of the detection.

12. During **operation**, the approval holder must include a list of the **risk profiles** of each turbine within the **project area** in each annual **compliance report** required under condition 35.

13. During **operation**, the approval holder must undertake turbine strike monitoring in accordance with the **Bird and Bat Management Plan** at monitoring sites identified in the **Bird and Bat Management Plan** and at all **high-risk turbines** identified as required under conditions 10 and 11.

14. The approval holder must annually evaluate the effectiveness of the measures implemented to avoid and mitigate **impacts** of turbine collision on **EPBC Act listed bird and bat species** and report on that evaluation, and performance against the **impact triggers**, in each annual **compliance report** required under condition 35.

15. If an **impact trigger** is reached or exceeded, the approval holder must implement the adaptive management procedure described in the **Bird and Bat Management Plan**. The approval holder must, on each occasion that an **impact trigger** is reached or exceeded, report on the steps taken and outcomes of implementing the adaptive management procedure, including details of the mitigation measures that have been or will be implemented and an assessment of their likely effectiveness in the first annual **compliance report** required under condition 35 following an **impact trigger** being reached or exceeded.

16. Within 20 **business days** of an **impact trigger** being reached or exceeded, if application of the adaptive management procedure required under condition 15 identifies, in respect of any wind turbine or number of wind turbines, that additional mitigation measures are required but no alternative mitigation measures can or will be implemented; and

    (a) If the additional mitigation measures are required in respect of the Ghost Bat or Spectacled Flying-fox, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** between sunset and sunrise each day; and/or

    (b) If the additional mitigation measures are required in respect of any nocturnal **EPBC Act listed migratory species**, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** between sunset and sunrise each day during the **migratory period** of any **EPBC Act listed migratory species** for which an **impact trigger** has been reached or exceeded; and/or

    (c) If the additional mitigation measures are required in respect of any diurnal **EPBC Act listed migratory species**, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** between sunrise and sunset each day during the **migratory period** of any **EPBC Act listed migratory species** for which an **impact trigger** has been reached or exceeded; and/or

    (d) If the additional mitigation measures are required in respect of any cathemeral **EPBC Act listed migratory species** or any **EPBC Act listed migratory species** for which diel activity is

unknown, the approval holder must cease to operate any wind turbine that contributed to reaching or exceeding an **impact trigger** the **migratory period** of any **EPBC Act listed migratory species** for which an **impact trigger** has been reached or exceeded.

17. Any request by the approval holder to cease or reduce the curtailment required under condition 16 must demonstrate how the ceasing or reducing of the curtailment will not result in any additional **impact** on **EPBC Act listed bird and bat species**.

Environmental offsets

18. To compensate for the **clearance** of **Magnificent Brood Frog habitat** and **Greater Glider habitat** as specified in condition 1(b)-(c), the approval holder must legally secure all environmental offsets proposed in the **Offset Area Management Plan** within 12 months of the **commencement of the action**. The **Offset Area Management Plan** must be attached to the legal mechanism used to **legally secure** the offset areas.

19. The approval holder must notify the Department within five **business days** of the legal security mechanism for each offset area being executed.

20. The legal mechanism used to **legally secure** the offset areas must remain in force for at least the duration of this approval.

21. To ensure that the offsets required under condition 18 provide a conservation gain in accordance with the **EPBC Act Environmental Offsets Policy**, the **completion criteria** must be achieved within 20 years of the **commencement of the action** and then be maintained or improved for the duration of the approval.

22. To ensure that the offsets required under condition 18 provide ongoing habitat for the Magnificent Brood Frog and Greater Glider, the key habitat features identified in the **Offset Area Management Plan** must be maintained or improved for the duration of the approval.

23. To ensure that the **completion criteria** will be achieved, performance against **performance targets** must be reported in each annual **compliance report** required under condition 35.

24. If a **performance target** is not met at the completion of each five year period, the approval holder must, on each occasion that a **performance target** is not met, report on the corrective action/s that will be implemented and an assessment of their likely effectiveness in the first annual **compliance report** required under condition 35 following a **performance target** not being met and all subsequent **compliance reports** required under condition 35 for the life of the approval.

25. If any of the **completion criteria** are not met within 20 years of the **commencement of the action**, the approval holder must, within 10 **business days** of the 20th anniversary of the **commencement of the action**, notify the **Department** of the **completion criteria** that have not been met. Within 6 months of the 20th anniversary of the **commencement of the action**, if the approval holder has not met all of the **completion criteria**, the approval holder must submit a supplementary Offset Area Management Plan that details the additional and/or revised management measures that will be implemented and/or alternative offset or offsets that will be provided to compensate for the failed offset and submit it to the **Department** to be approved in writing by the **Minister**. If approved in writing by the **Minister**, the approval holder must implement the approved supplementary Offset Area Management Plan.

26. At least 12 months and no more than 24 months following **commissioning**, the approval holder must submit a Residual Impacts Report which details the actual residual **impact** of the action on **Magnificent Brood Frog habitat** and **Greater Glider habitat** to the Department. The Residual

Impacts Report must be informed by a scientifically robust program of monitoring that has been endorsed by an **independent suitably qualified amphibian expert** and conducted by a **suitably qualified ecologist**. The Residual Impacts Report must be prepared by an **independent suitably qualified ecologist**.

27. If the actual residual **impact** of the action on **Magnificent Brood Frog habitat** or **Greater Glider habitat** is greater than the **impact** of the action on **Magnificent Brood Frog habitat** or **Greater Glider habitat** already offset, the approval holder must provide an environmental offset to compensate for the additional residual **impact** consistent with the **EPBC Act Environmental Offsets Policy**. The approval holder must, within 60 **business days** of submitting the Residual Impacts Report required under condition 26, submit a supplementary Offset Area Management Plan to the **Department** to be approved in writing by the **Minister**. If approved in writing by the **Minister**, the approval holder must implement the approved supplementary Offset Area Management Plan.

28. The supplementary Offset Area Management Plan, whether submitted under the requirements of condition 23 or condition 25, must include:

    (a) Details to demonstrate how the offset compensates for the residual **impact** on **Magnificent Brood Frog habitat** and **Greater Glider habitat** in accordance with the principles of the **EPBC Act Environmental Offsets Policy**;

    (b) A description of the offset, including location, size, condition, environmental values present and surrounding land uses;

    (c) Baseline data and other supporting evidence that documents the presence of each **listed threatened species** and the quality of each **listed threatened species** habitat within the offset area;

    (d) An assessment of **site habitat quality** using a method agreed to in writing by the **Department**;

    (e) Details of how the offset area will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for each **listed threatened species**;

    (f) Maps and **shapefiles** to clearly define the location and boundaries of the offset area, accompanied by **offset attributes**;

    (g) Specific offset completion criteria derived from the **site habitat quality** to demonstrate the improvement in the quality of each **listed threatened species** habitat in the offset area over the duration of this approval;

    (h) Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria;

    (i) Interim performance targets that set targets at appropriate intervals for progress towards achieving the offset completion criteria;

    (j) Details of the nature, timing and frequency of monitoring to inform progress against achieving the interim performance targets (the frequency of monitoring must be sufficient to track progress towards each set of interim performance targets, and sufficient to determine whether the offset area is likely to achieve those interim performance targets in adequate time to implement all necessary corrective actions);

    (k) Proposed timing for the submission of monitoring reports which provide evidence

demonstrating whether the interim performance targets have been achieved;

(l) Timing for the implementation of corrective actions if monitoring activities indicate the interim performance targets will not or have not been achieved;

(m) Evidence of how the management actions and corrective actions take into account relevant **approved conservation advices** and are consistent with relevant **recovery plans** and **threat abatement plans**; and

(n) Details of the legal mechanism for **legally securing** the offset area, such that legal security remains in force over the offset area for at least the duration of this approval.

Part B – Standard administrative conditions

Notification of date of commencement of the action

29. The approval holder must notify the **Department** in writing of the date of **commencement of the action** and the date of **commissioning** within 10 **business days** after the date of **commencement of the action**. The approval holder must notify the **Department** in writing of the date of **commissioning** within 10 **business days** after the date of **commissioning**.

30. If the **commencement of the action** does not occur within 5 years from the date of this approval, then the approval holder must not **commence the action** without the prior written agreement of the **Minister**.

Compliance records

31. The approval holder must maintain accurate and complete **compliance records**.

32. If the **Department** makes a request in writing, the approval holder must provide electronic copies of **compliance records** to the **Department** within the timeframe specified in the request.

Note: **Compliance records** may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, and or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the **Department**'s website or through the general media.

Preparation and publication of plans

33. The approval holder must:

(a) submit **plans** electronically to the **Department**;

(b) publish each **plan** on the website within 20 **business days** of the date of this approval, unless otherwise agreed to in writing by the **Minister** or, if a **plan** requires the approval of the **Minister**, within 20 **business days** of the date of the **Minister** approving the **plan**;

(c) exclude or redact **sensitive ecological data** from **plans** published on the website or provided to a member of the public; and

(d) keep **plans** published on the **website** until the end date of this approval.

34. The approval holder must ensure that any **monitoring data** (including **sensitive ecological data**), surveys, maps, and other spatial and metadata required under a **plan** and conditions of this approval, is prepared in accordance with the **Department's** *Guidelines for biological survey and*

mapped data (2018) and submitted electronically to the **Department** in accordance with the requirements of the **plan** and conditions.

Annual compliance reporting

35. The approval holder must prepare a **compliance report** for each 12-month period following the date of **commencement of the action**, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. The approval holder must:

    (a) publish each **compliance report** on the **website** within 60 **business days** following the relevant 12-month period;

    (b) notify the **Department** by email that a **compliance report** has been published on the **website** and provide the weblink for the **compliance report** within five **business days** of the date of publication;

    (c) keep all **compliance reports** publicly available on the **website** until this approval expires;

    (d) exclude or redact **sensitive ecological data** from **compliance reports** published on the website; and

    (e) where any **sensitive ecological data** has been excluded from the version published, submit the full **compliance report** to the **Department** within five **business days** of publication.

Note: **Compliance reports** may be published on the **Department**'s website.

Reporting non-compliance

36. The approval holder must notify the **Department** in writing of any: **incident;** non-compliance with the conditions; or non-compliance with the commitments made in **plans**. The notification must be given as soon as practicable, and no later than two **business days** after becoming aware of the **incident** or non-compliance. The notification must specify:

    (a) any condition which is or may be in breach;

    (b) a short description of the **incident** and/or non-compliance; and

    (c) the location (including co-ordinates), date, and time of the **incident** and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.

37. The approval holder must provide to the **Department** the details of any **incident** or non-compliance with the conditions or commitments made in **plans** as soon as practicable and no later than 10 **business days** after becoming aware of the **incident** or non-compliance, specifying:

    (a) any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;

    (b) the potential impacts of the **incident** or non-compliance; and

    (c) the method and timing of any remedial action that will be undertaken by the approval holder.

Independent audit

38. The approval holder must ensure that **independent audits** of compliance with the conditions are conducted as requested in writing by the Minister.

39. For each **independent audit**, the approval holder must:

(a) provide the name and qualifications of the independent auditor and the draft audit criteria to the **Department**;

(b) only commence the **independent audit** once the audit criteria have been approved in writing by the **Department**; and

(c) submit an audit report to the **Department** within the timeframe specified in the approved audit criteria.

40. The approval holder must publish the audit report on the **website** within 10 **business days** of receiving the **Department's** approval of the audit report and keep the audit report published on the **website** until the end date of this approval.

Completion of the action

41. Within 30 days after the **completion of the action**, the approval holder must notify the **Department** in writing and provide **completion data**.

Part C - Definitions

In these conditions, except where contrary intention is expressed, the following definitions are used:

Approved conservation advices means a conservation advice approved by the **Minister** under section 266B(2) of the **EPBC Act**.

Bird and Bat Management Plan means the *Kaban Green Power Hub – Bird and Bat Management Plan* dated 10 February 2020.

Business day means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.

Clear/cleared/clearing means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation (but not including weeds – see the Australian weeds strategy 2017 to 2027 for further guidance).

Commencement of the action/commence the action means the first instance of any specified activity associated with the action including **clearing** and **construction**. **Commencement of the action/commence the action** does not include minor physical disturbance necessary to:

(a) undertake pre-clearance surveys or monitoring programs;

(b) install signage and/or temporary fencing to prevent unapproved use of the project site (as defined in the **preliminary documentation**); and

(c) protect environmental and property assets from fire, weeds and pests, including maintenance or use of existing surface access tracks.

Commissioning/commissioned means all activities, including turning of turbines, after the components of the first complete wind turbine are installed.

Completion criteria means the performance criteria as stated in the **Offset Area Management Plan**.

Completion of the action means the time at which all approved conditions have been fully met.

Completion data means an environmental report and spatial data information clearly detailing how the conditions of this approval have been met. The **Department's** preferred spatial data format is **shapefile**. This includes, but is not limited to the:

(a) area of each **listed threatened species and community** habitat **cleared**; and

(b) quality of each **listed threatened species and community** habitat in the offset area at the end date of this approval.

Compliance records means all documentation or other material in whatever form required to demonstrate compliance with the conditions of approval in the approval holder's possession or that are within the approval holder's power to obtain lawfully.

Compliance reports means written reports:

(a) providing accurate and complete details of compliance, **incidents**, and non-compliance with the conditions and **plans**;

(b) consistent with the **Department's** *Annual Compliance Report Guidelines* (2014) (or subsequent revision);

(c) include a **shapefile** of any **impact** on any habitat for **listed threatened species** undertaken within the relevant 12-month period; and

(d) identifying the version/s of the **plans** prepared and in existence in relation to the conditions of this approval during the relevant 12-month period.

Construction means the erection of a building or structure that is or is to be fixed to the ground and wholly or partially fabricated on-site; the alteration, maintenance, repair or demolition of any building or structure; preliminary site preparation work which involves breaking of the ground; the laying of pipes and other prefabricated materials in the ground, and any associated excavation work; but excluding the installation of temporary fences and signage.

Department means the Australian Government agency responsible for administering the **EPBC Act**.

EPBC Act means the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

EPBC Act Environmental Offsets Policy means the **EPBC Act** *Environmental Offsets Policy* (2012), or subsequent revision, including the **Offset Assessment Guide**.

EPBC Act listed migratory species means the migratory fauna species listed under the **EPBC Act** for which this approval has effect, including:

(a) White-throated Needletail (*Hirundapus caudacutus*);

(b) Fork-tailed Swift (*Apus pacificus*);

(c) Oriental Cuckoo (*Cuculus optatus*);

(d) Latham's Snipe (*Gallinago hardwickii*);

(e) Black-faced Monarch (*Monarcha melanopsis*);

(f) Satin Flycatcher (*Myiagra cyanoleuca*);

(g) Rufous Fantail (*Rhipidura rufifrons*).

EPBC Act listed bird or bat species means the **EPBC Act listed threatened species** and **EPBC Act listed migratory species** for which this approval has effect that are bird or bat species.

EPBC Act listed threatened species means the threatened flora and fauna species listed under the **EPBC Act** for which this approval has effect, including:

(a) *Prostanthera clotteniana* (Prostanthera);

(b) Magnificent Brood Frog (*Pseudophryne covacevichae*);

(c) Greater Glider (*Petauroides volans*);

(d) Northern Quoll (*Dasyurus hallucatus*);

(e) Spectacled Flying-fox (*Pteropus conspicillatus*);

(f) Ghost bat (*Macroderma gigas*).

Fauna Management Plan means the *Kaban Green Power Hub – Fauna Management Plan* dated 14 February 2020.

Greater Glider habitat means all areas of eucalypt forests or woodlands that contain hollow-bearing trees, designated 'Great glider, red goshawk and black footed tree-rat' in Appendix D.

High-risk turbine means any turbine that any **EPBC listed threatened species** or **EPBC listed migratory species** that are bird or bat species have been detected within 350 metres radius of the turbine.

Impact/s/ed (verb) means to cause any measurable direct or indirect disturbance or harmful change as a result of any activity associated with the action. **Impact** (noun) means any measurable direct or indirect disturbance or harmful change as a result of any activity associated with the action.

Impact trigger means the identification, accounting for scavenger rate and searcher efficiency, within 180 m of any wind turbine or number of wind turbines of:

(a) any **EPBC Act listed threatened bat species** (or recognisable parts thereof); or

(b) 0.05% of the population of any **EPBC Act listed migratory species**:

i. 10 individuals (or recognisable parts thereof) of the White-throated Needletails (*Hirundapus caudacutus*);

ii. 100 individuals (or recognisable parts thereof) of the Fork-tailed Swift (*Apus pacificus*);

iii. 1,000 individuals (or recognisable parts thereof) of the Oriental Cuckoo (*Cuculus optatus*);

iv. 1,500 individuals (or recognisable parts thereof) of the Latham's Snipe (*Gallinago hardwickii*);

v. 460 individuals (or recognisable parts thereof) of the Black-faced Monarch (*Monarcha melanopsis*);

vi. 1,700 individuals (or recognisable parts thereof) of the Satin Flycatcher (*Myiagra cyanoleuca*);

vii. 4,800 individuals (or recognisable parts thereof) of the Rufous Fantail (*Rhipidura rufifrons*).

Incident means any event which has the potential to, or does, **impact** on any **protected matter**.

Independent means a person(s) that does not have an individual or by employment or family affiliation, any conflicting or competing interests with the approval holder; the approval holder's staff, representatives or associated persons; or the project, including any personal, financial, business or employment relationship, other than receiving payment for undertaking the role for which the condition requires an independent person.

Independent audit/s means an audit conducted by an **independent** and **suitably qualified person** as detailed in the ***EPBC Act*** *Independent Audit and Audit Report Guidelines* (2015), or subsequent revision.

Legally secure/ing means to secure a legal agreement under relevant Queensland legislation, in relation to a site, to provide enduring protection for the site against development incompatible with conservation.

Low-risk turbine A turbine is considered to be a **low-risk turbine** if **EPBC listed bird or bat species** are not detected within 350 metres radius of the turbine for a minimum of two years.

Magnificent Brood Frog habitat means all areas of seeps and drainage channels in eucalypt forests or woodlands with an understorey containing *Themeda triandra*, designated 'Magnificent Brood Frog low suitable habitat' and 'Magnificent Brood Frog high suitable habitat' in Appendix C.

Migratory period means the period of time during which each **EPBC Act listed migratory species** is likely to be found in north-eastern Australia, in accordance with the movement patterns for each **EPBC Act listed migratory species** as described in the Department's Species Profile and Threats database or another source endorsed by the Department.

Minister means the Australian Government Minister administering the **EPBC Act** including any delegate thereof.

Monitoring data means the data required to be recorded under the conditions of this approval.

Northern Quoll denning habitat means all areas of rocky outcrops and escarpments, designated 'Northern quoll habitat – Den' in Appendix E.

Northern Quoll habitat means all areas of eucalypt forests or woodlands, designated 'Northern quoll habitat – Den' and 'Northern quoll habitat – Foraging' in Appendix E.

Offset Area Management Plan means the *Kaban Green Power Hub – Offset Area Management Plan* dated 20 February 2020.

Offset Assessment Guide means the guidance document titled *How to use the Offsets assessment guide*, which includes the requirements for **habitat quality scores**, provided by the **Department** to assist users of the **EPBC Act Environmental Offsets Policy**.

Operation means all activities from the date the wind farm is **commissioned**.

Performance targets means the five-yearly habitat quality completion criteria as stated in the **Offset Area Management Plan**.

Plan/s means any of the documents required to be submitted to the **Department**, implemented by the approval holder and/or published on its **website** in accordance with these conditions.

Preliminary documentation means the *Kaban Green Power Hub EPBC 2018/8289 - Preliminary Documentation,* dated 10 December 2019, provided to the **Department** on 11 December 2019.

Project area means the area where the construction and operation of the action will be undertaken, designated 'project site' in Appendix A.

Prostanthera habitat means all areas of eucalypt forests or woodlands on granite or shallow clay rhyolite-derived soils, designated '*Prostanthera clotteniana* habitat' in Appendix B.

Protected matter/s means a matter protected under a controlling provision in Part 3 of the **EPBC Act** for which this approval has effect.

Recovery plan means a recovery plan made or adopted by the **Minister** under the **EPBC Act**.

Sensitive ecological data means data as defined in the Australian Government Department of the Environment *Sensitive Ecological Data – Access and Management Policy V1.0* (2016), or subsequent revision.

Shapefile means location and attribute information of the action provided in an Esri shapefile format. Shapefiles must contain '.shp', '.shx', '.dbf' files and a '.prj' file that specifies the projection/geographic coordinate system used. Shapefiles must also include an '.xml' metadata file that describes the shapefile for discovery and identification purposes.

Suitably qualified amphibian expert means a person with at least a postgraduate degree (or equivalent) in a suitable area (such as herpetology) and a minimum of 10 years relevant experience in amphibian monitoring, including at least one year of experience in Australia.

Suitably qualified ecologist means a person who has professional qualifications and at least three years of work experience designing and implementing surveys for the **listed threatened species** and their habitat, and can give an authoritative assessment and advice on the presence and habitat requirements of the **listed threatened species** using relevant protocols, standards, methods and/or literature.

Suitably qualified person means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.

Threat abatement plans means a threat abatement plan made or adopted by the **Minister** under the **EPBC Act**.

Risk profile means the risk of an individual wind turbine having an impact on an **EPBC listed bird and bat species**. A turbine is considered to be a **high-risk turbine** if **EPBC listed threatened species** or **EPBC listed migratory species** that are bird or bat species are detected within 350 metres radius of the turbine. A turbine is considered to be a **low-risk turbine** if **EPBC listed bird or bat species** are not detected within 350 metres radius of the turbine for a minimum of two years. A **high-rist turbine** may be downgraded to a **low-risk turbine** if no **EPBC listed threatened species** or **EPBC listed migratory species** that are bird or bat species are detected within the **vicinity** of the turbine for a minimum of two years.

Vegetation Management Plan means the *Kaban Green Power Hub – Vegetation Management Plan* dated 10 February 2020.

Vicinity means within 350 metres radius of the turbine.

Website means a set of related web pages located under a single domain name attributed to the approval holder and available to the public.

APPENDICES

Appendix A: Project area

Appendix B: Prostanthera habitat

Appendix C: Magnificent Brood Frog habitat

Appendix D: Greater Glider habitat

Appendix E: Northern Quoll habitat and Northern Quoll denning habitat

Appendix A: Project area

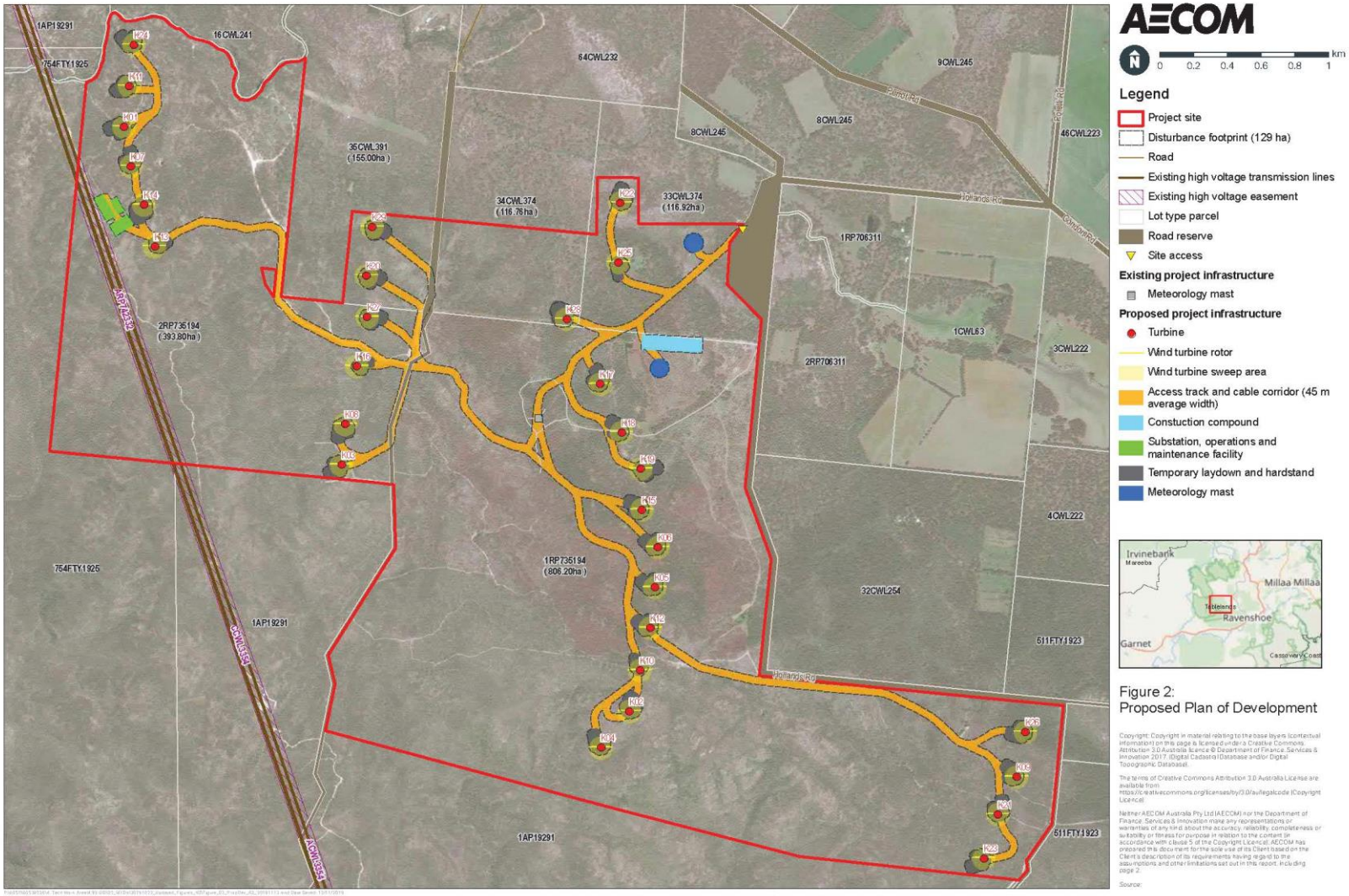


Figure 2:
Proposed Plan of Development

Appendix B: Prostanthera habitat

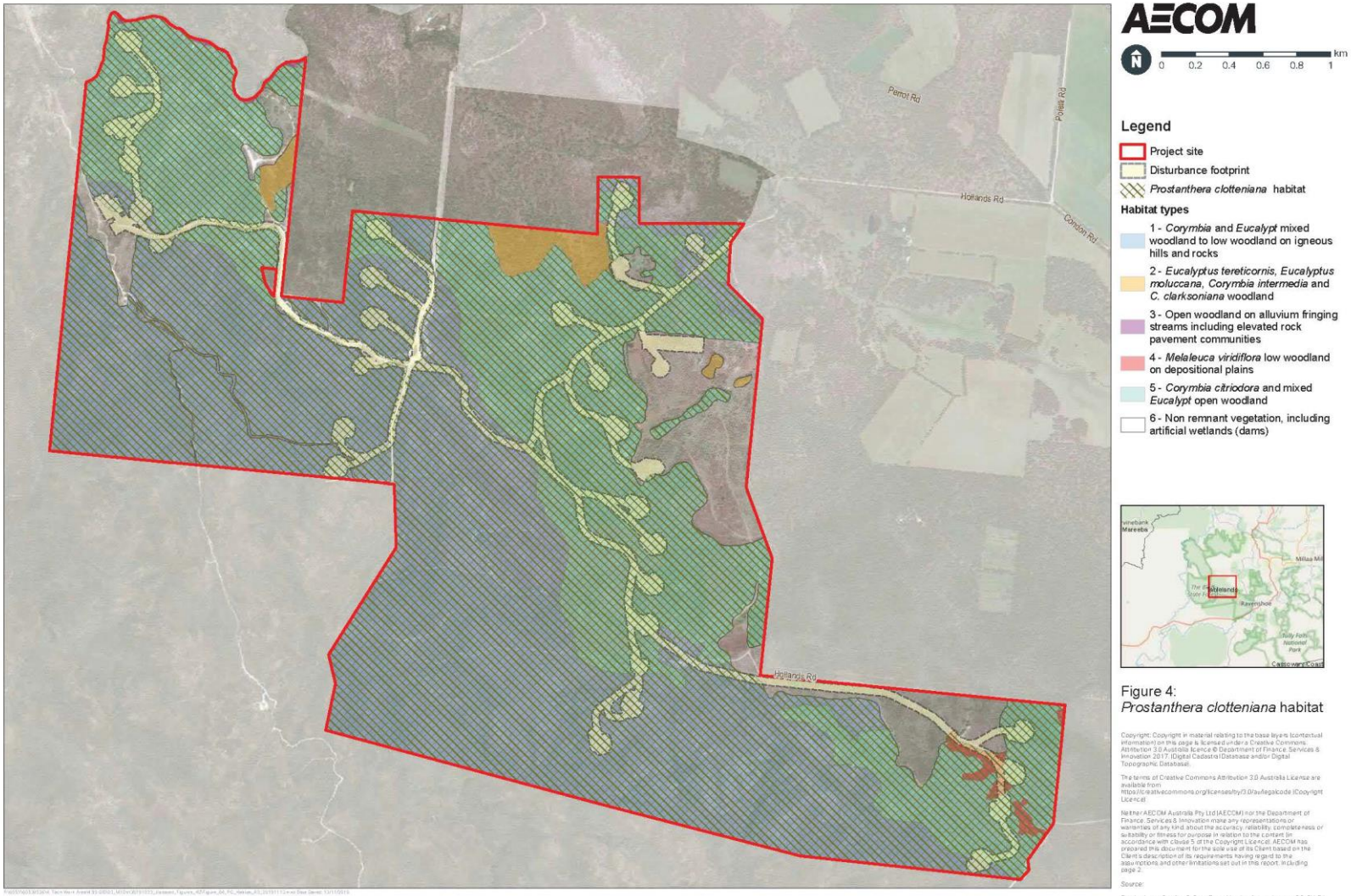
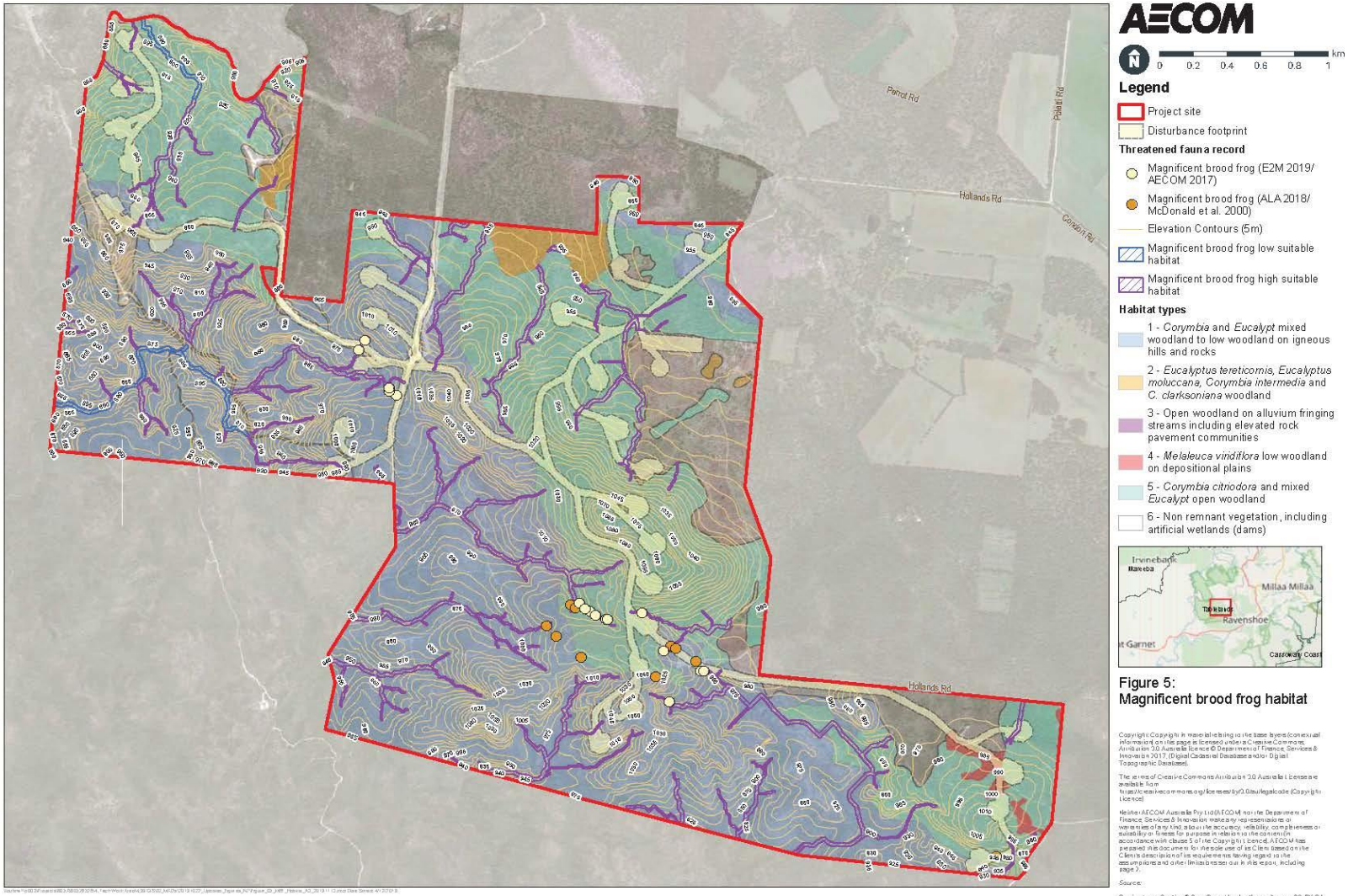


Figure 4:
Prostanthera clotteniana habitat

Source:

Appendix C: Magnificent Brood Frog habitat



AECOM

0 0.2 0.4 0.6 0.8 1 km

Legend

- Project site
- Disturbance footprint

Threatened fauna record

- Magnificent brood frog (E2M 2019/ AECOM 2017)
- Magnificent brood frog (ALA 2018/ McDonald et al. 2000)
- Elevation Contours (5m)
- Magnificent brood frog low suitable habitat
- Magnificent brood frog high suitable habitat

Habitat types

- 1 - *Corymbia* and *Eucalypt* mixed woodland to low woodland on igneous hills and rocks
- 2 - *Eucalyptus tereticornis, Eucalyptus moluccana, Corymbia intermedia* and *C. clarksoniana* woodland
- 3 - Open woodland on alluvium fringing streams including elevated rock pavement communities
- 4 - *Melaleuca viridiflora* low woodland on depositional plains
- 5 - *Corymbia citriodora* and mixed *Eucalypt* open woodland
- 6 - Non remnant vegetation, including artificial wetlands (dams)

Figure 5:
Magnificent brood frog habitat

Appendix D: Greater Glider habitat

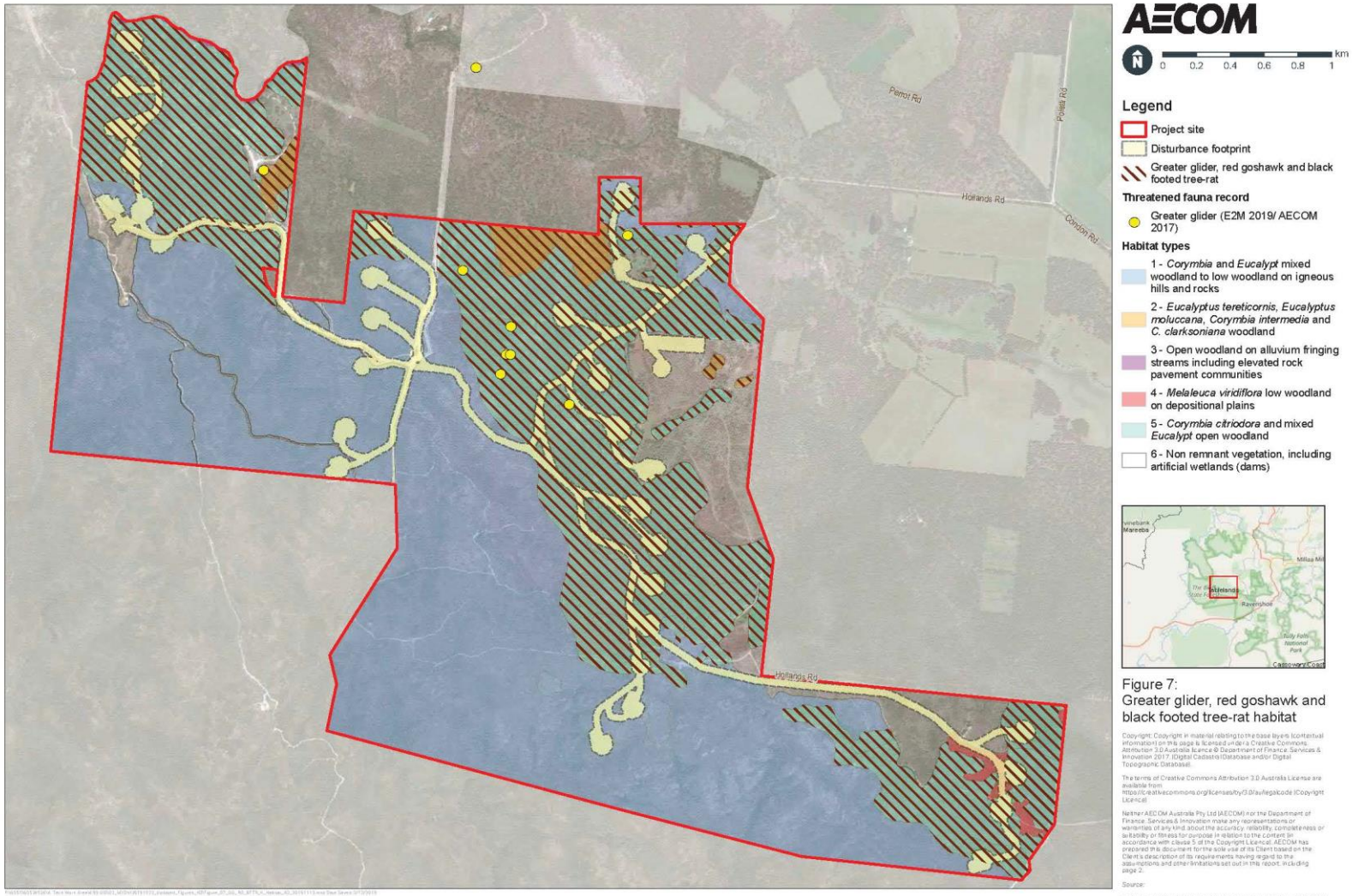


Figure 7:
Greater glider, red goshawk and black footed tree-rat habitat

Source:

Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

Appendix E: Northern Quoll habitat and Northern Quoll denning habitat

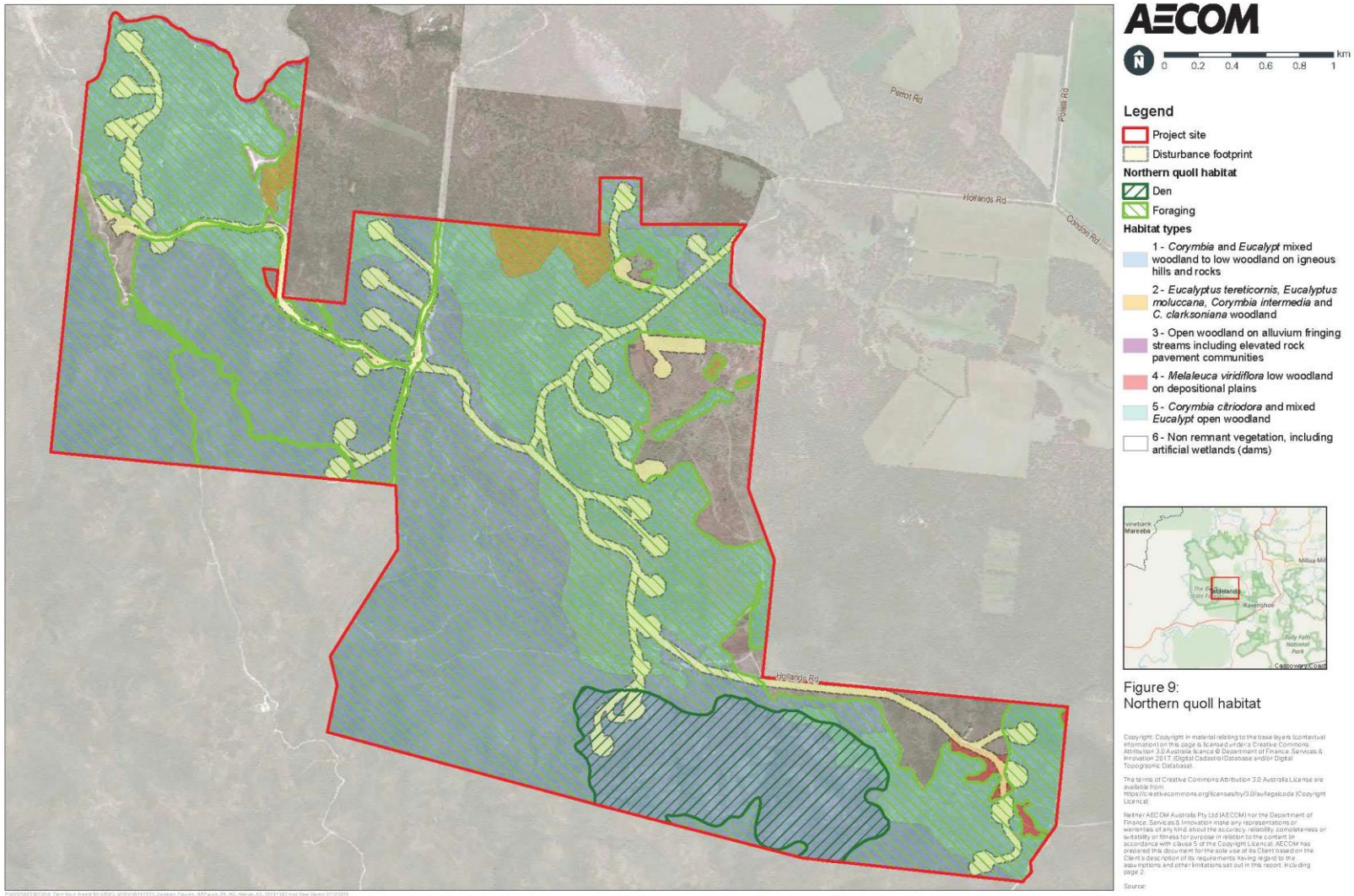


Figure 9:
Northern quoll habitat

Source:

Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus