Kaban Green Power Hub – Vegetation Management Plan

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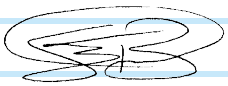
8	10/05/2021	Issued for Use	Chays Ogston	Scott Baker	

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Definitions

Term	Definition
Disturbance footprint	The approved clearing extent based on the proposed layout.
The site	The areas of Lot 1 on RP735194, Lot 33 on CWL374, Lot 35 on CWL391, Lot 2 on RP735194 and Lot 34 on CWL374 that will be disturbed as part of the proposed development.
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat includes preferred environmental conditions of flora
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered (E), vulnerable (V) or conservation dependent (CD) under the *Environmental Protection and Biodiversity Conservation Act 1999* or extinct in the wild (PE), Endangered, Vulnerable or Near Threatened (EVNT) under the *Nature Conservation Act 1992*.

Abbreviations

Abbreviation	Description
AS 4970-2009	Australian Standard: Protection of trees on development sites
CPM Act	*Coastal Protection and Management Act 1995*
DA	Development application
DAWE	Commonwealth Government Department of Agriculture, Water and the Environment
DEE	Commonwealth Government Department of the Environment and Energy
DES	Queensland Department of Environment and Science
DNRME	Queensland Department of Natural Resources, Mines and Energy
E	Endangered
E2M	E2M Pty Ltd
EO Act	*Environmental Offsets Act 2014* (QLD)
EOP	Environmental Offsets Policy
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
Fisheries Act	*Fisheries Act 1994* (QLD)
ha	hectares
km/h	kilometre per hour
LC	Least concern
LGA	Local Government Area
km^2	Square kilometres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance

Abbreviation	Description
NC Act	*Nature Conservation Act 1992* (QLD)
NC Regulation	*Nature Conservation Wildlife Regulation 2006* (QLD)
NT	Near Threatened
OC	Of concern
Planning Act	*Planning Act 2016* (QLD)
Planning Regulation	*Planning Regulation 2017* (QLD)
RE	Regional Ecosystem
RFI	Request for Information
SARA	Queensland State Assessment and Referral Agency
SDAP	State Development Assessment Provisions
SPP	State Planning Policy (July 2017) (QLD)
sp.	Singular species. For example, *Eucalyptus* sp. refers to a single species of *Eucalyptus*
spp.	Multiple species. For example, *Eucalyptus* spp. refers to multiple species of *Eucalyptus*
TEC	Threatened Ecological Community
TRC	Tablelands Regional Council
VM Act	*Vegetation Management Act 1999* (QLD)
VMP	Vegetation Management Plan
VENM	Virgin Excavated Natural Material

1 Introduction

1.1 Background

Neoen Australia Pty Ltd (Neoen) propose to develop the Kaban Green Power Hub (the project) in north Queensland to use the available wind resource to supply renewable energy to the national electricity market. The project is located near the township of Tumoulin, Queensland, within the Tablelands Regional Council (TRC) Local Government Area (LGA). The project consists of a wind farm development containing up to 28 wind turbines, battery storage and ancillary infrastructure, located across the following land parcels (Figure 1), herein collectively referred to as 'the site':

- Lot 1 on RP735194
- Lot 2 on RP735194
- Lot 33 on CWL374
- Lot 34 on CWL374
- Lot 35 on CWL391
- section of local road reserve.

E2M Pty Ltd (E2M) has been commissioned by AECOM Australia Pty Ltd (AECOM) to provide supporting documentation, including a Vegetation Management Plan (VMP) in accordance with *State Code 23: Wind farm development planning guideline* (Department of Infrastructure, Local Government and Planning, 2017) and *Environmental Management Plan Guidelines* (Department of the Environment, 2014). This document will act to provide detailed mitigation and management measures to limit impacts on Matters of State Environmental Significance (MSES) and Matters of National of National Environmental Significance (MNES), while informing the assessment of:

1. the Development Application (DA) (Ref: 60528526) submitted to the State Assessment and Referral Agency (SARA); and.
2. the EPBC Act referral (Ref: 2018/8289) submitted to the Department of Agriculture, Water and the Environment (DAWE), formerly the Department of the Environment and Energy (DEE).

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 D. Included as part of the approval conditions (Appendix D), 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 reduced clearing impact area of 128 ha. As such, changes to the project do not exceed the maximum clearing limits as approved in EPBC 2018/8289: Approved 21 April 2020. This VMP 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.

1.2 Scope and objectives

The objective of this VMP is to detail how potential impacts of the development on vegetation, specifically MSES and MNES, will be minimised and managed throughout the lifespan of the project. This VMP will achieve this through providing:

- a description of the nature and location of activities (Section 1.1 and Section 1.4).

- a description on the proposed project schedule (Section 1.4).
- a description of the current extent and condition of vegetation across the site, including mapping the location of threatened flora habitat and known records (Section 3.1 and Section 3.2).
- a description of the location and extent of works required, including detailing how these have been designed to minimise impacts on vegetation (Section 3.3 and Section 5).
- a description of roles, responsibilities and training associated with the management plan (Section 5.2 and Section 5.3).
- mitigation and management measures to be implemented throughout the construction and operation phases to reduce significant residual impacts on vegetation (Section 5), including but not limited to:
  - signage requirements
  - clearing procedures and protocols; and
  - protection measures for threatened species individuals and populations.
- rehabilitation and revegetation measures (Section 5.7).
- monitoring and reporting requirements for pre-construction, construction and post-construction/operation phases, which includes but is not limited to:
  - weed monitoring
  - threatened flora monitoring; and
  - rehabilitation monitoring.

1.3 Site description

The site consists largely of remnant eucalypt woodlands with small areas of non-remnant vegetation. The primary land use across the site is cattle grazing that has impacted the shrub and ground vegetation throughout the site (AECOM 2017). The site is bound by Bluff State Forest to the south and west, and rural properties to the north and east.

1.4 Project description

The proposed project will include the construction and operation of:

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

The proposed development layout is presented in Figure 1

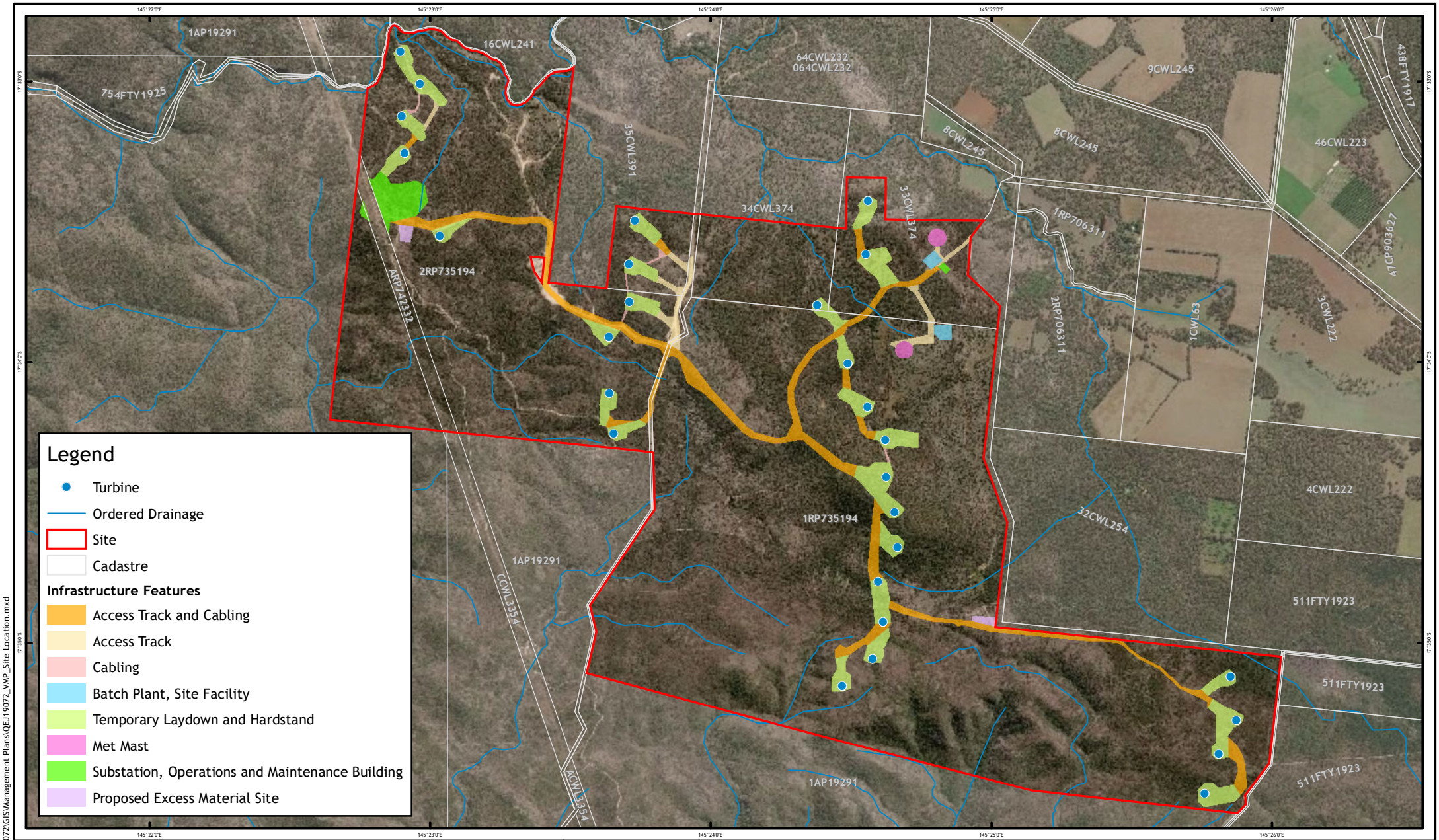
1.4.1 Final location of infrastructure - micro-siting

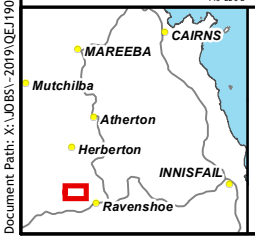
Micro-siting, as referred to in this document, is the minor change in infrastructure location according to avoidance of ecologically important areas and/or unfavourable engineering considerations (i.e. adverse topography). The micro-siting of all infrastructure will occur following pre-clearance surveys. The proposed project design detailed in Section 1.4 will be subject to micro-siting prior to final infrastructure placement.

1.5 Project schedule

The current proposed project schedule is:

- February 2021 – Pre-clearance surveys completed.
- May 2021 - Start of construction (physical work started on the site)
- December 2022 - End of construction (end of physical construction work at site)
- December 2022 to December 2047 - Operation (No construction works at site to be carried out)
- January 2048 - Decommissioning (Dismantle the operating asset).





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Kilometres

Coordinate System: GCS GDA 1994

Notes:
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Infrastructure: © Neoen 2021

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7	Issued for Use	CD	CO	02/02/2021
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FIGURE 1: SITE LOCATION AND DEVELOPMENT LAYOUT

Vegetation Management Plan
Kaban Green Power Hub

Map Number	Job Number	Rev
1 of 1	QEJ19072	7

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2 Legislative context

2.1 Commonwealth legislative considerations

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects the environment in relation to MNES. Under the EPBC Act, if a development proposal involves an action that is likely to result in a significant impact on an MNES, referral to the Commonwealth Government Department of Agriculture, Water and the Environment (DAWE) is required. Subsequently, the project (termed a 'proposed action' by the DAWE) has been referred to the DAWE who concluded the proposed action is a 'controlled action'.

2.1.2 EPBC Act Environmental Offsets Policy

The EPBC Act Environmental Offsets Policy (EOP) outlines the federal government's approach to the use of environmental offsets under the EPBC Act, which is a streamlined national environment assessment and approvals process. The policy was finalised on 20 September 2012 and applies to any referrals and variations to approval conditions from 2 October 2012.

Specifically, the EPBC Act EOP applies to project assessments and approvals under Parts 8 and 9 of the EPBC Act, in addition to strategic assessments under Part 10. Where appropriate, 'environmental offsets' are considered during the assessment phase of an environmental impact assessment under the EPBC Act. Offsets are relative and should compensate for 'residual significant impacts' an action has on MNES after all reasonable actions to avoid or mitigate environmental damage have been investigated.

2.2 State legislative considerations

2.2.1 Planning Act 2016

The *Planning Act 2016* (Planning Act) is Queensland's key piece of legislation pertaining to the strategic planning and development of the State. The Planning Act mandates the framework of planning instruments and process for development assessment whilst incorporating the regulatory requirements of other Queensland environmental statutory legislation, such as the *Vegetation Management Act 1999* (VM Act), *Coastal Protection and Management Act 1995* (CPM Act) and *Fisheries Act 1994* (Fisheries Act).

Subordinate to the Planning Act, the *Planning Regulation 2017* (Planning Regulation) details the mechanics for the operation of the Planning Act. This includes prescription of accepted, prohibited and assessable development, assessment benchmarks for assessable development and identification of the assessment manager (i.e. the chief executive or local government).

2.2.1.1 State Planning Policy (July 2017)

The purpose of State planning instruments such as the State Planning Policy (SPP) (July 2017), is to guide local and State government in land use planning and development by defining the Queensland Government policies relating to matters of State interest. Local governments must consider the State interest and reflect appropriately when amending local planning schemes and assessing development applications.

2.2.1.2 State Development Assessment Provisions – State Code 23 Wind Farm Development

The purpose of *State Code 23: Wind farm development planning guideline*, of the State Development Assessment Provisions (SDAP) is to provide assistance in the preparation of development applications for new or expanding wind farms and assist in responding to the performance outcomes and acceptable outcomes of the code. This code prescribes the requirement for the development of a VMP for any proposed wind farm project.

2.2.2 Vegetation Management Act 1999

The clearing of native vegetation and essential habitat in Queensland is regulated by the VM Act. The purpose of the VM Act is to conserve remnant vegetation, conserve vegetation in declared areas, prevent the loss of biodiversity, maintain ecological processes, allow for sustainable land use etc.

Mapping is provided by Department of Natural Resources, Mines and Energy (DNRME), which outlines vegetation categories used to determine clearing and assessment requirements under the Planning Act.

2.2.3 Nature Conservation Act 1992

The primary purpose of the *Nature Conservation Act 1992* (NC Act) is to conserve biodiversity by creating and managing protected areas, managing and protecting native flora and fauna and managing the spread of introduced/non-native (i.e. pest) wildlife. Proposed developments must take into consideration wildlife and natural areas protected under the NC Act and associated regulations and determine if permits or approvals are required to undertake the proposed works.

2.2.3.1 Protected Plants

The *Nature Conservation Wildlife Regulation 2006* (NC Regulation) lists flora and fauna species considered to be extinct in the wild, EVNT or least concern in Queensland. Clearing of protected plants (i.e. EVNT species) is regulated by the NC Regulation. Further, the State Government has produced a mapping layer which triggers a flora survey requirement if disturbance is proposed within a mapped area.

2.2.4 Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) outlines the framework for environmental offsets within Queensland and how they should be provided. As defined within Section 7 of the EO Act, an environmental offset is an *activity undertaken to counterbalance a significant residual impact of a prescribed activity on a prescribed environmental matter*, such as matters of national, State or Local significance.

Environmental offsets are not an assessment trigger but are imposed as a condition for a proposed activity. Categorising instruments such as the Planning Regulation and local planning schemes identify assessment benchmarks that require prescribed activities to firstly demonstrate how all reasonable avoidance and mitigation measures have been, or will be, undertaken. Following this, if a significant residual impact on the prescribed environmental matter remains, an environmental offset may be required and conditioned.

2.3 Local legislative considerations

The site is located within the TRC LGA and as such, is subject to the provisions of the *Tablelands Regional Council Planning Scheme Version 3* (Tablelands Regional Council, 2017). The property holding details and associated overlays applicable to the site are presented in Table 1.

Table 1 Property holding details for the site

Lot and Plan	Lot 1 on RP735194; Lot 33 on CWL374 Lot 35 on CWL391 Lot 2 on RP735194 Lot 34 on CWL374 and a section of local road reserve.
Zone	Rural

Overlays relevant to ecological matters	• Environmental Significance
	  • Wetland Values (MSES – Regulated Vegetation Intersecting a Watercourse)
	  • Vegetation and Habitat (MSES – Wildlife Habitat and MSES – Regulated Vegetation)

3 Existing vegetation

3.1 Vegetation communities

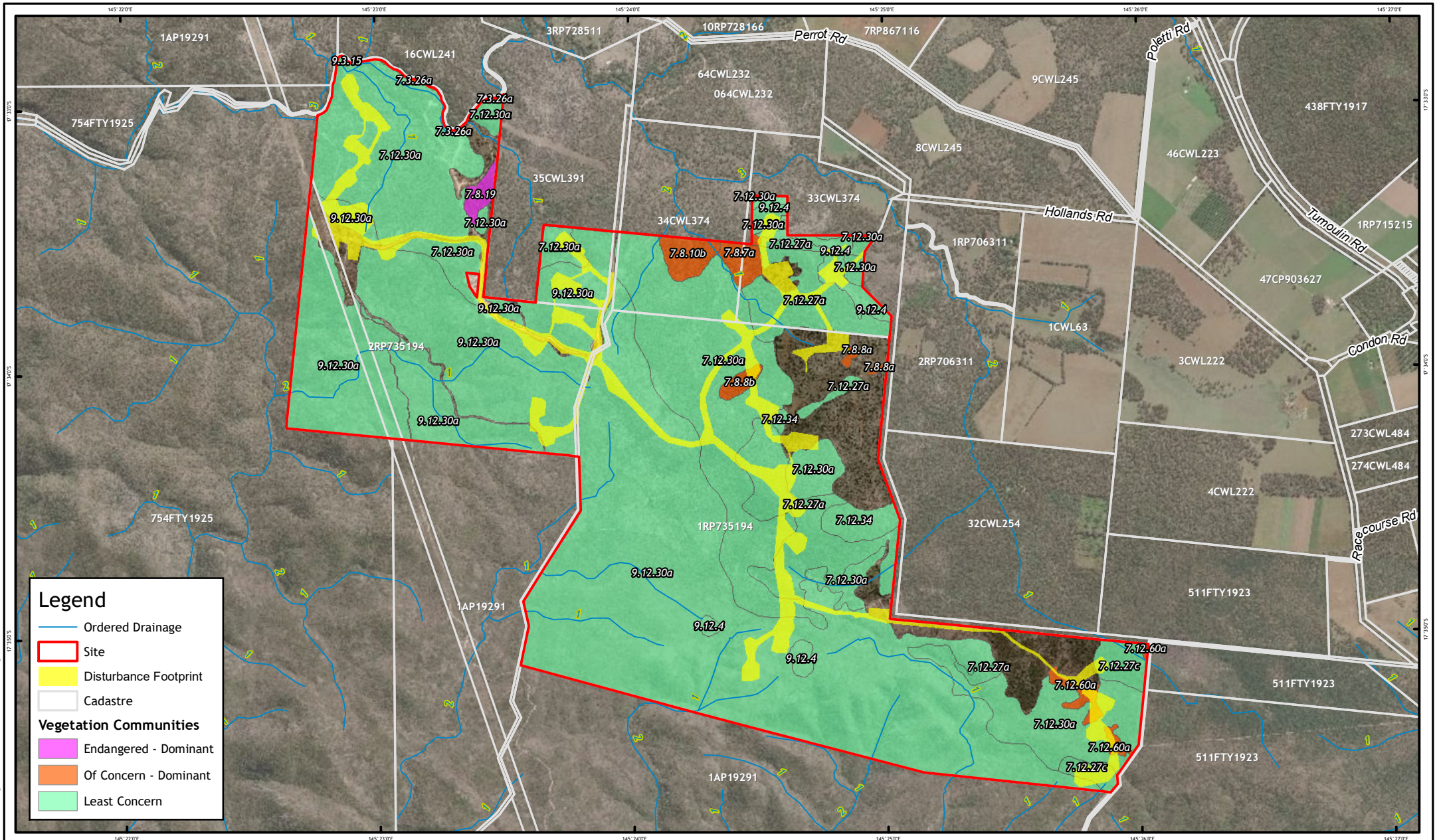
The site is predominately covered by remnant vegetation consistent with 15 different Regional Ecosystems (RE), including one 'Endangered' RE, six 'Of Concern' REs and eight 'Least Concern' REs, under the VM Act (Figure 2) (AECOM 2017, E2M 2019a). None of the REs identified across the site are consistent with any EPBC Act Threatened Ecological Communities (TECs) (AECOM 2017, E2M 2019a). A description of the communities, along with associated conservation status and extent of occurrence across the site in hectares (ha), is provided in Table 2.

Table 2 Vegetation communities mapped within the site

RE	Community Description	VM Act Status[1]	Areas within the Site (ha)
7.3.26a	*Casuarina cunninghamiana, Eucalyptus tereticornis, Lophostemon suaveolens, Melaleuca leucadendra, M. fluviatilis, Buckinghamia celsissima, Mallotus philippensis* woodland on alluvium fringing streams.	OC	0.9
7.8.7a	*Eucalyptus tereticornis* open forest, tall open forest and woodland on basalt uplands, of the moist rainfall zone.	OC	7.2
7.8.8a	*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	1.5
7.8.8b	*Eucalyptus reducta* open forest to woodland. Uplands and highlands on basalt, of the moist rainfall zone.	OC	3.6
7.8.10b	*Eucalyptus moluccana* woodland to open forest. Uplands and highlands on basalt, of the dry rainfall zone.	OC	8.9
7.8.19	*Corymbia clarksoniana* open forest to woodland on basalt.	E	5
7.12.27a	*Eucalyptus reducta* medium open forest and woodland. Uplands and highlands on shallow granitic and rhyolitic soils, of the moist rainfall zone.	LC	92
7.12.27c	*Eucalyptus resinifera* and *Syncarpia glomulifera* open woodland. Uplands and highlands on shallow granitic and rhyolitic soils of the moist rainfall zone.	LC	15.5
7.12.30a	*Corymbia citriodora, Eucalyptus portuensis, C. intermedia, Syncarpia glomulifera* woodland to low woodland top open forest with *Callitris intratropica, Acacia calyculata* and *Xanthorrhoea johnsonii*.	LC	346.7
7.12.34	*Eucalyptus portuensis* and/or *E. drepanophylla*, +/- *C. intermedia* +/- *C. citriodora*, +/- *E. granitica* open woodland to open forest on uplands on granite.	LC	12.5

RE	Community Description	VM Act Status[1]	Areas within the Site (ha)
7.12.60a	Floodplain (other than floodplain wetlands). *Melaleuca viridiflora* woodland. Granite and Rhyolite.	OC	7.2
7.12.65a	Rock pavement communities of dry rainfall zone with *Acacia leptostachya, Eucalyptus lockyeri* subsp. *exuta, Lophostemon confertus, L. suaveolens, Persoonia falcata, Ficus rubiginosa* and *Allocasuarina inophloia*.	LC	0.2
9.3.15	*Eucalyptus tereticornis* +/- *Casuarina cunninghamiana* +/- *Melaleuca* spp. fringing woodland on channels and levees.	LC	0.2
9.12.4	*Eucalyptus shirleyi* and/or *E. melanophloia* and/or *Corymbia peltata* and/or *Callitris intratropica* low open woodland on igneous rocks.	LC	19.3
9.12.30a	Woodland to open forest of *Corymbia leichhardtii* and *Eucalyptus cloeziana* +/- *E. portuensis* +/- *C. citriodora* subsp. *citriodora* +/- *E. cullenii* +/- *Callitris intratropica*.	LC	681.5
Non-remnant	Non-remnant vegetation	N/A	143.2
		Total	**1345.4**

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



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Kilometres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Notes:
Aerial Imagery: © ESRI 2018
Cadastre: © DNRME 2018
Ordered Drainage: © DNRME 2018
Road: © PSMA 2014
Vegetation Communities: © AECOM 2017 / E2M 2019
Disturbance Footprint: © Neoen 2021

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FIGURE 2: VEGETATION COMMUNITIES

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Kaban Green Power Hub

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1 of 1	QEJ19072	7

3.2 Threatened flora

Based on the findings of the Flora Technical Report (AECOM, 2017), Ecological Gap Analysis (E2M, 2019a),RFI – Ecological Assessment Report (E2M, 2019b) and Protected Plants Survey (AECOM, 2019), eight threatened flora species were identified as having a likelihood of occurrence of moderate or greater, including two species, *Plectranthus amoenus* and *Diuris oporina*, known to occur within the site (Table 3).

Plectranthus amoenus is known from four populations within the site, containing a total of 88 individuals, with populations ranging from six to 41 individuals. While no individuals occur within the disturbance footprint the closest individual occurs approximately 10 m from the edge of disturbance (Figure 3).

Diuris oporina was identified in small numbers (1-10 individuals) across seven locations, with a total of 25 individuals recorded across the site. Other species were determined high or moderate likelihood of occurring due to large areas of suitable habitat being mapped across the site (Figure 3).

Species habitat and identification descriptions for *Plectranthus amoenus* and *Diuris oporina* are presented in Appendix B.

Table 3 Threatened flora species with a moderate or greater likelihood of occurrence

Species	Conservation Status[1]		Likelihood of Occurrence	Suitable Vegetation Communities	Potential Habitat within the Site (ha)
	NC Act	EPBC Act			
Aponogeton bullosus	E	-	High	7.3.26a and within waterways (10m watercourse buffer)	35.20
Diuris oporina (northern white donkeys tail)	NT	-	Known	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	1,135.7
Grevillea glossadenia	V	-	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	1,135.7
Homoranthus porteri	V	-	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	1,135.7
Melaleuca sylvana	E	-	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	1,135.7
Oenanthe javanica	NT	-	Moderate	7.3.26a and in riparian zones (30m watercourse buffer)	104.00
Plectranthus amoenus	V	-	Known	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	1,135.7
Prostanthera clotteniana	E	CE	Moderate	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	1,135.7

[1]Conservation Status – NT = Near Threatened, V = Vulnerable, E = Endangered, CE = Critically Endangered

3.3 Weeds

To assist in limiting potential impacts from weed invasion within the site, priority weeds have been identified, which 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.

Priority weeds currently known to occur within the site are presented in Table 4. A full list of priority weed species present within the site will determined following pre-clearance surveys. Appendix A provides identification descriptions and control measures for *Biosecurity Act 2014* 'Restricted Matter' and 'Prohibited Matter' weed species known to occur within the site.

Table 4 Priority weeds known to occur within the site

Species	Biosecurity Act 2014	TRC Biosecurity Plan
Grader Grass (*Themeda quadrivalvis*)	-	-
Guinea Grass (*Megathyrsus maximus*)	-	-
Lantana (*Lanata camara*)	Category 3 Restricted Matter	-
Praxelis (*Praxelis clematidea*)	-	-
Rhodes Grass (*Chloris gayana*)	-	-
Signal Grass (*Urochloa decumbens*)	-	-
Singapore daisy (*Sphagneticola trilobata*)	Category 3 Restricted Matter	-

4 Extent of works – Vegetation clearing and impacts on threatened flora

Proposed disturbance areas discussed in the following sections are based on the proposed layout and a conservative disturbance footprint. As discussed in Section 1.4.1, micro-siting of project infrastructure following pre-clearance surveys will not result in additional habitat removal above that approved.

4.1 Vegetation clearing

Based on the current project design, the project will result in the disturbance of up to 127.9 ha of vegetation, including 100.2 ha of remnant vegetation (Figure 2). The project design has been altered to reduce impact on any *of concern* or *endangered* regional ecosystems. Of the seven conservation significant vegetation communities identified in Section 3.1 as occurring on site, the proposed project will result in the removal of vegetation from only three communities. In total, 3.9 ha of conservation significant vegetation will be disturbed. Additionally, the project will result in the removal of 96.3 ha of *least concern* remnant vegetation. Table 5 identifies the potential impact extent of the project on each vegetation community. As previously stated, this area will be larger than the final project design and has been established to manage the worst-case scenario flora impacts.

Table 5 Of Concern and Endangered vegetation communities – potential disturbance areas

RE	VM Act Status[1]	Potential Impact Extent (ha)	RE	VM Act Status[1]	Potential Impact Extent (ha)
7.8.7a	OC	0.1	7.12.34	LC	0.1
7.8.8a	OC	<0.1[2]	7.12.60a	OC	3
7.8.8b	OC	0.8	9.12.4	LC	3.3
7.12.27a	LC	17.4	9.12.30a	LC	36.7
7.12.27c	LC	3.5	Non-remnant	N/A	27.7
7.12.30a	LC	35.3			

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

[2] The area of 7.8.8a to be removed is 0.0004 ha

4.2 Threatened flora

Based on the current project design, approximately 11 *Diuris oporina* individuals will be removed. In addition, the project will result in the removal of areas of suitable habitat for *Diuris oporina*, *Plectranthus amoenus* and the other seven species considered as having a moderate or high likelihood of occurring within the site. The eight threatened flora species that may occur within the site and the area of suitable habitat that may be impacted by the project has been presented in Table 6.

Species profiles for the two species known to occur within the site are presented in Appendix B.

Table 6 Threatened flora potential disturbance areas

Species	Conservation Status[1]		Likelihood of occurrence	Suitable Vegetation Communities	Potential Impact Extent (ha)
	NC Act	EPBC Act			
Aponogeton bullosus	E	-	High	7.3.26a and within waterways (10m watercourse buffer)	0.5
Diuris oporina (northern white donkeys tail)	NT	-	Known	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	92.9
Grevillea glossadenia	V	-	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	92.9
Homoranthus porteri	V	-	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	92.9
Melaleuca sylvana	E	-	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	92.9
Oenanthe javanica	NT	-	Moderate	7.3.26a and in riparian zones (30m watercourse buffer)	1.6
Plectranthus amoenus	V	-	Known	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	92.9
Prostanthera clotteniana	E	CE	High	7.12.27a / 7.12.27c / 7.12.30a / 9.12.30a	92.9

5 Mitigation and management measures

Mitigation and management measures prescribed in this section are derived from current best practice and information detailed in the following guidelines and procedures:

- *State Code 23: Wind Farm Development Planning Guideline* (Department of Infrastructure, Local Government and Planning 2017)
- *Environmental Management Plan Guidelines* (Department of the Environment, 2014)
- *Tablelands Regional Council Planning Scheme Version 3* (Tablelands Regional Council, 2017); and
- Relevant species EPBC Act 'Conservation Advice' and 'Recovery Plans'.

5.1 Performance criteria / management objectives

Performance criteria / management objectives associated within vegetation relevant to the project include:

- Micro-siting does not result in additional disturbance to threatened flora or communities above what is approved
- No exceedance of approved clearing limits
- No introduction or spread of priority weed species within the site and successful removal of priority weed species within the disturbance footprint
- No loss or decline in threatened flora population sizes resulting from indirect impacts associated with construction and operation; and
- Progressive stabilisation of disturbed areas and rehabilitation of the disturbance footprint following construction.

5.2 Roles and responsibilities

The roles and responsibilities assigned to individuals are outlined in Table 7.

Table 7 Roles and responsibilities

Roles	Responsibility	Activities
Site Project Manager	Overseeing construction and operation works	• Ensure processes are in place to include the necessary provisions of the VMP into works/projects • Ensure that contractual arrangements with the contractors specify the need for adequate training to be provided to all members of the construction crew involved in the project • Ensure construction workers are trained in the procedures of the VMP • Implement monitoring programs • Undertake and record corrective actions; and • Report to regulatory authorities.
Site Construction Manager	Construction	• Implement the requirements of the VMP throughout the construction phase.

Roles	Responsibility	Activities
Site Environment Officer	Ensure the supervising engineer and contractors are implementing the requirements of VMP throughout the construction and operation phases.	• Undertake monitoring in accordance with the VMP; and • Meet with the site supervisor and audit site works to ensure compliance with the VMP as required.
Independent Ecologist	Provide ecological expertise	• Undertake pre-clearance surveys and monitoring in accordance with the VMP; and • Provide ecological advice as required.
Rehabilitation Contractor	Rehabilitation works	• Undertake rehabilitation works in accordance with the VMP.
All site personnel	Construction and Operation	• Receive training • Abide by VMP requirements; and • Report environmental incidents.

5.3 Training requirements

The effectiveness of the VMP will depend on those responsible for its implementation. Those responsible must be familiar with the content of the VMP to ensure successful implementation of the management actions. The site manager will ensure relevant individuals are trained in the procedures of the VMP and are capable of implementation. This will involve a site induction or "toolbox" training outlining the contents of the VMP including the vegetation retention/clearing plan prior to the construction phase. A copy of this VMP is to be retained and displayed at the site office at all times during the construction phase.

5.4 Vegetation protection measures

Table 8 provides mitigation and management measures to be implemented to minimise impacts on Of Concern and Endangered regional ecosystems, remnant vegetation, and threatened flora species.

Table 8 Vegetation clearing mitigation and management measures

Project Phase	Activity	Management Practices	Responsibility
Pre-construction	Pre-clearance surveys	Pre-clearance surveys will be undertaken prior to construction to identify and mark threatened flora to be avoided or managed during clearing.	Independent Ecologist
	Infrastructure planning / Siting	Locate infrastructure to avoid and/or minimise impacts. Wherever practical, micro-siting to avoid removal of vegetation particularly regulated vegetation, waterways and areas of known threatened flora locations.	Project design team Consistency review by Site Environment Officer
	Linear Infrastructure Planning/ Siting	Locate access tracks and electrical connections adjacent to existing access or farm tracks to minimise clearing required.	Site Environment Officer
	Erosion and sediment control plan	Prepare an Erosion and Sediment Control Plan (ESCP) to minimise potential impacts on threatened flora.	Site Environment Officer
	Site Preparation	Clearly demarcate extent of clearing works required. The extent of disturbance / clearing is to be clearly demarcated with fencing, spray paint, flagging tape, barricade webbing, signage or similar, depending on the duration of the disturbance. Areas outside of demarcated extents are considered to be 'no go' zones.	Site Construction Manager
		Where Of Concern or Endangered regulated vegetation occurs immediately adjacent to areas of earthworks, install tree protection measures in accordance with *Australian Standard: Protection of trees on development sites* (AS 4970-2009).	Site Construction Manager

Project Phase	Activity	Management Practices	Responsibility
		Where known threatened flora records occur immediately adjacent to disturbance / clearing, a fenced exclusion zone will be established around the known individuals.	Site Construction Manager
	Site Induction / Work Instruction	Prior to site entry, all relevant site personnel including contractors shall be appropriately trained and made aware of the requirements of the VMP.	Site Construction Manager
		All relevant site personnel are to be advised of 'no-go' zones. The following activities are not to occur in these zones: • Storage and mixing of materials • Vehicle parking • Liquid disposal • Machinery repairs and/or refuelling • Construction site office or shed • Combustion of any material • Stockpiling of soil, rubble or debris; and Any filling or excavation including trenching, topsoil skimming and/or surface excavation.	Site Construction Manager
Construction	Vegetation Clearing	Vegetation clearing activities are to be kept to the minimum required to facilitate construction activities.	Site Construction Manager
		Vegetation clearing is restricted to identified work areas only.	Site Construction Manager
		Trees immediately adjacent to work areas will be pruned rather than cleared, particularly along access tracks.	Site Construction Manager
		Vegetation clearing is to be conducted directionally towards areas of retained vegetation.	Site Construction Manager
		Stockpiling is to be limited to the disturbance footprint prior to milling, chipping, or mulching.	Site Construction Manager

Project Phase	Activity	Management Practices	Responsibility
		No works, including stockpiling, storage of machinery, parking of vehicles or mixing of chemicals are to be located within adjacent vegetated areas.	Site Construction Manager
	Vegetation Re-use	Native felled vegetation is to be used on-site. This may include stockpiling, milling, chipping and mulching.	Site Construction Manager
		Habitat features including surface rock, large logs or hollow limbs are to be re-located to adjacent areas.	Site Construction Manager
		Weed material is to be disposed of at an appropriate waste disposal facility.	Site Construction Manager
	Access	Access is to occur along designated access tracks only.	All site personnel
		A maximum speed limit of 40 km/hr is designated for all access tracks.	Site Construction Manager
	Construction Activities	All no-go zones are to remain in place throughout the construction phase.	All site personnel
	Dust suppression	Dust suppression measures will be implemented throughout construction to limit impacts of dust on retained vegetation	Site Construction Manager
Post-construction / operation	Access	Access is to occur along designated access tracks only.	All site personnel
	Access	A maximum speed limit of 40km/hr is designated for all access tracks.	Site Project Manager

5.5 Weed management measures

Mitigation and management measures to be implemented to prevent the introduction and spread of priority weeds, throughout the project disturbance area have been summarised in Table 9.

Table 9 Weed prevention mitigation and management measures

Project Phase	Activity	Management Practices	Responsibility
Pre-construction	Pre-clearance surveys	Pre-clearance surveys will be undertaken prior to construction to identify and mark areas of weed infestation to be treated or avoided during construction.	Independent Ecologist
	Infrastructure planning / siting	Identify priority weeds occurring in construction areas prior to disturbance. Log GPS point, species, and extent of infestation. Determine 'clean' and 'infested' construction zones.	Project design team, Site Environment Officer
	Site Preparation	Install wash bay at entrance to site, for cleaning with pressurised water into a containment area.	Site Construction Manager
		Where priority weeds occur within the disturbance footprint, treat or remove weeds prior to construction commencing.	Site Construction Manager
		All vehicles and machinery are to be cleaned (tyres brushed, undercarriage washed down, floor mats shaken out) and certified by an accredited weed hygiene inspector (AHCBIO201A), prior to entering the site. Should a vehicle exit the site and leave a well-formed road, upon return to site, the vehicle will be required to be cleaned and recertified. Note: A well-formed road could include any unsealed local roads and/or graded private driveway/track.	Site Construction Manager
	Site Induction / Work Instruction	Prior to site entry, all relevant site personnel including contractors shall be appropriately trained and made aware of the requirements of the VMP.	Site Construction Manager
		Specific landholder requirements for each property are to be expressed to all site personnel.	Site Construction Manager
Construction	Vegetation Clearing	Minimise the extent of work areas and soil disturbances.	Site Construction Manager

Project Phase	Activity	Management Practices	Responsibility
	Access	All vehicles and machinery are to be cleaned (tyres brushed, undercarriage washed down, floor mats shaken out) and certified by an accredited weed hygiene inspector (AHCBIO201A), prior to entering the site. Should a vehicle exit the site and leave a well-formed road, upon return to site, the vehicle will be required to be cleaned and recertified. Note: A well-formed road could include any unsealed local roads and/or graded private driveway/track.	All Site Personnel
		Access is to occur along designated access tracks only. Minimise access in periods of wet weather.	All Site Personnel
	Construction Activities	All no-go zones are to remain in place throughout the construction phase.	All Site Personnel
		All storage of machinery and equipment is to be limited to disturbed areas.	Site Construction Manager
		Imported fill (if required) is to be weed free and certified as Virgin Excavated Natural Material (VENM).	Site Construction Manager
		Ongoing treatment of weed infestations is required throughout construction.	Site Construction Manager
		Re-establish vegetation immediately following disturbances to prevent weed infestation, as per Section 5.6.	Site Construction Manager
Post-construction / operation	Access	All vehicles and machinery are to be cleaned (tyres brushed, undercarriage washed down, floor mats shaken out) and certified by an accredited weed hygiene inspector (AHCBIO201A), prior to entering the site. Should a vehicle exit the site and leave a well-formed road, upon return to site, the vehicle will be required to be cleaned and recertified. Note: A well-formed road could include any unsealed local roads and/or graded private driveway/track.	All Site Personnel
		Access is to occur along designated access tracks only.	All Site Personnel
	Rehabilitation	Weed management is to be undertaken as part of rehabilitation works.	Site Construction Manager

5.6 Erosion and sediment control measures

An Erosion and Sediment Control Plan (ESCP) will be prepared prior to construction to minimise the potential impacts on threatened flora.

5.7 Rehabilitation measures

Site rehabilitation management measures which are to be progressively implemented throughout construction are presented in Table 10. Progressive rehabilitation will commence within four weeks of area no longer being required. The immediate intent of rehabilitation actions throughout construction is to re-establish site surfaces as soon as possible after disturbance to assist with erosion mitigation and prevent the establishment of weed species. Successful rehabilitation would meet the following performance objectives:

- Self-sustaining vegetative cover
- No signs of subsidence or erosion
- Representative of species richness and diversity of pre-disturbed condition
- Plants showing healthy growth and signs of recruitment; and
- Free of priority weeds.

Schedule 1 of the TRC Planning Scheme defines that the minimum area required to be revegetated / rehabilitated for the project is 150 square metres (m^2) per turbine or the entire disturbance area, whichever is smaller. Based on the 28 turbines proposed the project requires the revegetation/rehabilitation of 0.42 ha.

Ongoing maintenance will be undertaken within the rehabilitation areas as per the schedule prescribed in Table 11 or until the performance criteria described in Table 12 has been met. Rehabilitation species pallets for each disturbed RE within the site are prescribed in Appendix C.

Table 10 Rehabilitation management measures

Project Phase	Activity	Management Practices	Responsibility
Pre-construction	Site Preparation	Where priority weeds occur, treat or remove weeds prior to construction commencing.	Site Construction Manager
	Site Induction / Work Instruction	Prior to site entry, all relevant site personnel including contractors shall be appropriately trained and made aware of the requirements of the VMP.	Site Construction Manager
Construction	Stockpile Management	Stockpile topsoil within areas of disturbance for re-use as part of site rehabilitation.	Site Construction Manager
		Seed with dominant native grass species (*Themeda triandra* (kangaroo grass)) where stockpiles are in place for extended period of time.	Site Construction Manager
	Construction Activities	Access is to occur along designated access tracks only.	All Site Personnel

Project Phase	Activity	Management Practices	Responsibility
		All no-go zones are to remain in place throughout the construction phase.	All Site Personnel
	Rehabilitation	Prior to the commencement of rehabilitation activities, undertake treatment of priority weeds.	Rehabilitation Contractor
		Retain topsoil profile, separate from subsoil, and re-spread as medium for planting. Where soil has been compacted, ripping is required prior to re-spreading of topsoil.	Rehabilitation Contractor
		Seed with dominant native grass species (*Themeda triandra* (kangaroo grass)) to stabilise disturbed areas that require re-use. Where rainfall is not sufficient, watering will be required.	Rehabilitation Contractor
		Where ongoing disturbance in not required, use tube-stock to re-establish dominant native species representative of the pre-cleared regional ecosystem (Appendix C). Avoid re-establishing canopy trees within 200 m of turbines. Watering will be required where rainfall is insufficient.	Rehabilitation Contractor
		Where required, install temporary stock fencing until stabilisation is achieved.	Rehabilitation Contractor
		Ongoing treatment of weed infestations is required throughout construction and as part of rehabilitation monitoring.	Rehabilitation Contractor
Post-construction / operation	Rehabilitation Monitoring	Monitoring of rehabilitation against rehabilitation performance criteria. Identification of required maintenance actions.	Site Environment Officer
	Rehabilitation Maintenance	Weed control measures such as spraying, physical removal, or planting native species to suppress weed growth.	Rehabilitation Contractor

Table 11 Rehabilitation maintenance schedule

Timeframe	Management Actions
3 months, 6 months, 9 months	• Weed control; • Watering as required; • Reinstate erosion and sediment control (as required); • Determine if fencing is required to exclude livestock.
12 months	• Weed control; • Watering as required; • Where natural regeneration is deemed unsuccessful due to unviable seedbank (i.e – optimal conditions for natural regeneration have occurred, and no evidence of growth is observed), replant with tubestock. Where conditions are not considered optimal, re-assess in 6-12 months; • Reinstate erosion and sediment control measures (as required); • Maintain fencing.
18 months	• Weed control; • Replacement of plant mortalities (as required); • Watering as required; • Where natural regeneration is deemed unsuccessful due to unviable seedbank (i.e. optimal conditions for natural regeneration have occurred, and no evidence of growth is observed), replant with tubestock. Where conditions are not considered optimal, re-assess in 6-12 months; • Reinstate erosion and sediment control measures (as required); • Maintain fencing.
24 months	• At 2 years, determine if rehabilitation is complete. Identify schedule for management actions where rehabilitation is not complete.

Table 12 Rehabilitation performance criteria

Indicator	3 months	6 months	9 months	12 months	18 months	24 months
Seeded Areas / Natural Regeneration						
Native Groundcover Species Richness	≥20% of pre-disturbance species richness	≥40% of pre-disturbance species richness	≥40% of pre-disturbance species richness	≥60% of pre-disturbance species richness	≥80% of pre-disturbance species richness	≥90% of pre-disturbance species richness
Priority Weeds	≤5% priority weed cover	≤5% priority weed cover	≤5% priority cover	No priority weeds	No priority weeds	No priority weeds
Mulching	≥100mm deep mulch cover around planted stock	≥100mm deep mulch cover around planted stock	-	-	-	-
***Assisted Revegetation Areas**						
Plant Survival	≥80% survival of planted stock	≥90% survival of planted stock	≥90% survival of planted stock	≥95% survival of planted stock	≥95% survival of planted stock	≥95% survival of planted stock
Plant Height	Evidence of growth	Evidence of growth	Evidence of growth	All planted canopy & shrub stock ≥0.3m high	All planted canopy & shrub stock ≥0.4m high	All planted canopy & shrub stock ≥0.6m high

* Assisted revegetation is only to occur in areas where seeding and natural regeneration is not meeting performance criteria after 12 months.

6 Monitoring and reporting schedule

The mitigation and management measures detailed in Section 5 will be monitored throughout the life of the project to ensure their ongoing effectiveness. Regularly monitoring the effectiveness of the mitigation measures over time allows the VMP to be adapted if environmental performance criteria are not met.

The following sections detail the:

- monitoring activities and reporting requirements for the project's pre-construction, construction and post-construction / operation phases; and
- performance criteria, triggers and corrective actions of each monitoring activity.

Monitoring requirements associated with fauna are prescribed in the Kaban Green Power Hub – Fauna Management Plan (E2M, 2021b), while monitoring associated with potential turbine collisions impacts on birds and bats are prescribed in the Kaban Green Power Hub – Bird and Bat Management Plan (E2M, 2021a).

Annual monitoring reports, including survey data, mitigation measures implemented and recommendations for next year, will be submitted to DAWE within three months of the completion of each yearly monitoring event/period.

6.1 Pre-construction

The objective of the pre-construction monitoring requirements is to establish a set of baseline data demonstrating the condition or status of environmental values prior to disturbance. Key monitoring and reporting requirements pre-construction relate to the identification and avoidance of impacts to threatened flora and weed species. These requirements are outlined in Table 13.

Table 13 Pre-construction monitoring requirements

Activity	Frequency	Timing	Purpose	Reporting	Responsibility
Pre-clearance survey	One off	Within 3 months prior to commencement of construction	Identify and quantify threatened flora and weed infestations to be avoided or managed during construction.	Pre-clearance Report	Independent Ecologist

6.2 Construction

During the construction phase, the key monitoring and reporting requirements during construction relate largely to ensuring compliance with vegetation protection, weed management and rehabilitation mitigation measures prescribed in this plan. These requirements as well as the mitigation measures, performance criteria, triggers and monitoring specifications required to evaluate the prescribed mitigation measures are detailed in Table 14. Specific monitoring methods for threatened flora monitoring methods are prescribed in Section 6.2.1.

6.2.1 Threatened flora monitoring

Threatened flora monitoring will be undertaken every second year during construction and include assessment of retained threatened flora identified during pre-clearance surveys. Surveys will aim to determine any indirect impacts of the project on retained threatened flora through quantification of individuals and assessment of their condition.

6.3 Post-construction / operation

Key monitoring and reporting requirements during post-construction / operation relate to ensuring compliance with vegetation protection, weed management and rehabilitation mitigation measures prescribed in this plan. These requirements are outlined in Table 14.

Table 14 Construction and post-construction /operation monitoring requirements

Performance criteria	Triggers	Frequency of monitoring	Responsibility	Reporting	Corrective Action
Construction					
No exceedance of approved clearing limits	Extent of works not clearly demarcated.	• Daily throughout vegetation clearing. • Weekly inspection at other times.	Site Construction Manager	Environmental Incidents Register	• Re-instate demarcations; and • Re-education.
	Protection fencing not installed around retained trees or threatened flora.	• Daily throughout vegetation clearing. • Weekly inspection at other times.	Site Construction Manager	Environmental Incidents Register	• Re-instate demarcations; and • Re-education.
	Excess vegetation clearing.	Daily throughout vegetation clearing.	Site Construction Manager	Environmental Incidents Register	• Notify Site Environment Officer immediately to record incident in register. • Site Environmental Officer to notify DAWE and/or DES within 48hrs of incident to identify remedial action required. • Remedial action will require: – Additional offsets; and/or – Immediate restoration and rehabilitation.

Performance criteria	Triggers	Frequency of monitoring	Responsibility	Reporting	Corrective Action
	Storage of machinery or stockpiles located in vegetated areas.	• Daily throughout vegetation clearing. • Weekly inspection at other times.	Site Construction Manager	Environmental Incidents Register	• Site Environmental Officer to notify DAWE and/or DES within 48hrs of incident. • Remove stockpiles and machinery from vegetated areas, rehabilitate damaged areas.
	Felled vegetation burned or disposed of.	Weekly	Site Construction Manager	Environmental Incidents Register	• Site Environmental Officer to notify DAWE and/or DES within 48hrs of incident. • Re-education; and • Re-use on site.
	Vehicle and personnel traversing areas outside of approved access tracks and zones.	As required	Site Construction Manager	Environmental Incidents Register	• Re-education.
No introduction or spread of priority weed species within the site and successful removal of priority weed species within the disturbance footprint	Existing infestations not GPS located.	Weekly check of records	Site Environment Officer	Environmental Incidents Register / Annual Weed Monitoring Report	• GPS infestations; and • Undertake weed management.
	Vehicles/machinery do not have valid weed certificate	Weekly inspection of vehicle hygiene certificates	Site Environment Officer	Environmental Incidents Register	• Immediate washdown of vehicle; • Re-education; and • Ongoing weed monitoring and treatment.

Performance criteria	Triggers	Frequency of monitoring	Responsibility	Reporting	Corrective Action
	New weed infestation identified, or existing infestations spread	Monthly	Site Environment Officer	Environmental Incidents Register / Annual Weed Monitoring Report	• Site Environmental Officer to notify DAWE and/or DES within 48hrs of incident. • Assessment of prescribed mitigation measures and update VMP where required. • Ongoing weed monitoring and treatment.
Progressive stabilisation of disturbed areas and rehabilitation of the disturbance footprint following construction	Rehabilitation not meeting success criteria (refer to Table 12)	Quarterly for the first 12 months and every 6 months until 2 years or until performance criteria have been achieved	Site Environment Officer	Annual Rehabilitation Monitoring Report	• Treat priority weeds; • Where rehabilitation areas are not meeting performance criteria, utilise tubestock to assist with rehabilitation; • Replace damaged / dead seedlings; and • Install fencing as required to prevent damage by livestock.
No loss or decline in threatened flora population sizes resulting from indirect impacts associated with construction and operation	Threatened flora populations adjacent to disturbance decline	Every second year (Threatened Flora Monitoring)	Independent Ecologist	Threatened Flora Monitoring Report	• Notify DAWE and/or DES within 48hrs of confirmation of population decline. • Assessment of prescribed mitigation measures and update VMP where required.

Performance criteria	Triggers	Frequency of monitoring	Responsibility	Reporting	Corrective Action
Post-construction / Operation					
No introduction or spread of priority weed species within the site and successful removal of priority weed species within the disturbance footprint	New weed infestation identified, or existing infestations spread	Annually	Site Environment Officer	Environmental Incidents Register / Annual Weed Monitoring Report	• Assessment of prescribed mitigation measures and update VMP where required. • Ongoing weed monitoring and treatment.
Progressive stabilisation of disturbed areas and rehabilitation of the disturbance footprint following construction	Rehabilitation not meeting success criteria (refer to Table 12)	Quarterly for the first 12 months and every 6 months until 2 years or until performance criteria have been achieved	Site Environment Officer	Annual Rehabilitation Monitoring Report	• Treat priority weeds; • Where rehabilitation areas are not meeting seeded / natural regeneration success criteria, utilise tubestock to assist with rehabilitation; • Replace damaged / dead seedlings; and • Install fencing as required to prevent damage by livestock.
No loss or decline in threatened flora population sizes resulting from indirect impacts associated with construction and operation	Threatened flora populations adjacent to disturbance decline	Every 5 years (Threatened Flora Monitoring)	Independent Ecologist	Threatened Flora Monitoring Report	• Notify DAWE and/or DES within 48hrs of confirmation of population decline. • Investigate potential cause of decline • Assessment of prescribed mitigation measures and update VMP where required.

7 Adaptive management

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

- Where there is a significant change to the project schedule, site layout, or a change in the construction methods that require amendment to flora protection measures;
- Where a corrective action is recorded or performance criteria are not being met and additional measures are identified for inclusion to prevent reoccurrence. Table 15 prescribes example additional mitigation measures which may be investigated where performance criteria are not being met; and
- Where a change in legislation or best practice methodology has been identified.

To ensure compliance with this VMP a compliance register will be developed to outline all EPBC Act obligations and track how these obligations are being met. This compliance register will include document tracking for all reporting required, along with how data and reporting is stored and disseminated.

Table 15 Example mitigation measures to be investigated where performance criteria are not being met

Non-compliances	Mitigation measure[1]	Likelihood of impact continuing	Implementation schedule
Continued introduction and spread of priority weeds	• Establish exclusion / no-go zones in high risk areas • Increase frequency of washdowns • Increase frequency of weed control measures	Low	As soon as possible
Failure to stabilise disturbed areas	• Use jute matting to assist in soil stabilisation • Investigate the use of soil ameliorants to improve ground cover establishment	Low	As soon as possible
Threatened flora populations decline due to indirect impacts	• Fence off threatened flora populations to minimise potential indirect impacts including cattle grazing • Undertake rehabilitation of area in accordance with the VMP	Low	As soon as possible

1 = Implementation of these mitigation measures will be dependent on the causation of the non-compliances

8 References

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Appendix A Biosecurity Act 2014 ‘Restricted’ and ‘Prohibited’ Plant Removal Strategies

Department of Agriculture and Fisheries
Biosecurity Queensland

Restricted invasive plant

Lantana

Lantana camara

Currently, lantana covers more than 5 million ha of subcoastal New South Wales to Far North Queensland. Small infestations of lantana have also been found in central west Queensland, the Northern Territory, Western Australia, South Australia and Victoria. Efforts are under way to control these.

Lantana is mainly spread by fruit-eating birds and mammals. It forms dense thickets that smother and kill native vegetation and are impenetrable to animals, people and vehicles.

Research indicates more than 1400 native species are negatively affected by lantana invasion, including many endangered and threatened species. As lantana is a woody shrub that has thin, combustible canes, its presence can also create hotter bushfires, altering native vegetation communities and pastures.

Queensland Government

Legal requirements

All lantana species (*Lantana camara* and *Lantana montevidensis*) are restricted invasive plants under the *Biosecurity Act 2014*. They must not be given away, sold, or released into the environment without a permit. The Act requires everyone to take all reasonable and practical steps to minimise the risks associated with invasive plants and animals under their control. This is called a general biosecurity obligation (GBO). This fact sheet gives examples of how you can meet your GBO.

At a local level, each local government must have a biosecurity plan that covers invasive plants and animals in its area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws. Contact your local government for more information.

Description

Lantana camara is a heavily branched shrub that can grow in compact clumps, dense thickets or as a climbing vine.

The stems are square in cross section, with small, recurved prickles. Most leaves are about 6 cm long and are covered in fine hairs. They are bright green above, paler beneath and have round-toothed edges. Leaves grow opposite one another along the stem. When crushed the leaves produce a distinctive odour.

Flowers appear throughout most of the year in clustered, compact heads about 2.5 cm in diameter. Flower colours vary from pale cream to yellow, white, pink, orange and red. Lantana produces round, berry-like fruit that turn from glossy green to purplish-black when ripe.

Life cycle

Flowering and germination occurs all year round but peaks after summer rains. Several thousand seeds can be produced per square metre and these can remain viable for several years.

Research indicates some ornamental lantana varieties have the ability to set seed and can spread vegetatively. They also produce some viable pollen and have the potential to cross-pollinate with wild forms, creating new varieties that could naturalise in the environment.

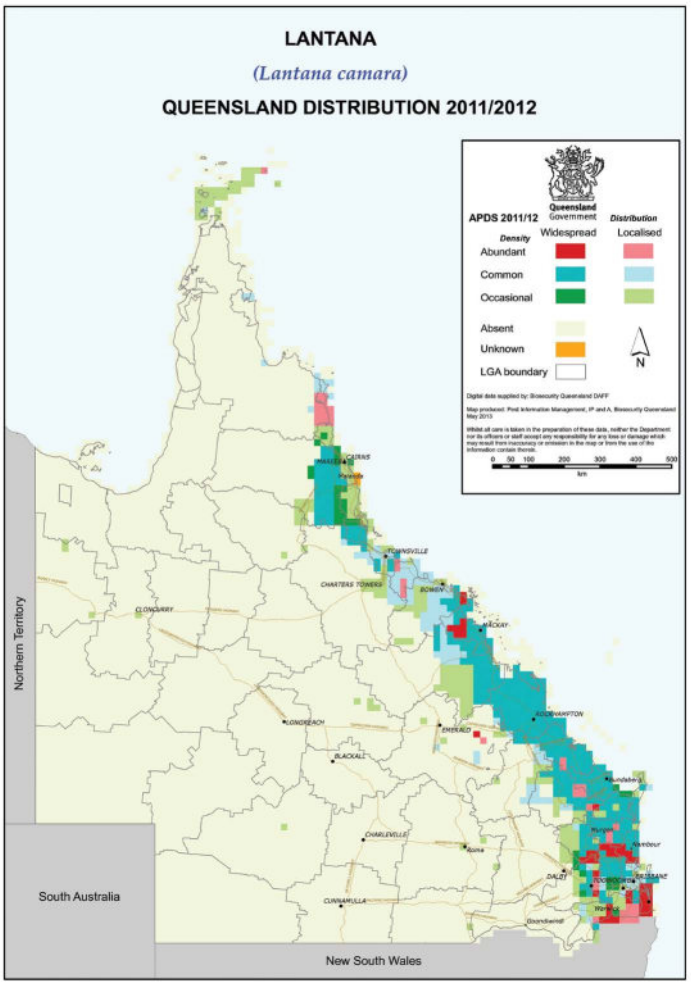
If the number of naturalised varieties increase due to genetic drift from ornamental varieties, it will make finding effective biological control agents even more difficult and potentially extend the climatic tolerances and range of the weed's spread.

Methods of spread

Spread mostly through the garden ornamental trade, by fruit eating birds and mammals.

Lantana camara can also spread via a process known as layering, where horizontal stems take root when they are in contact with moist soil. It will also reshoot from the base of vertical stems.

Map 1. Distribution of *Lantana camara* in Queensland



Habitat and distribution

Lantana camara is native to the tropical and subtropical regions of North, Central and South America.

Lantana camara is found throughout most coastal and subcoastal areas of eastern Australia, from the Torres Strait islands to southern New South Wales. It grows in a wide variety of habitats, from exposed dry hillsides to wet, heavily shaded gullies.

Toxicity

Many lantana varieties are poisonous to stock. It is difficult to tell which varieties are toxic so it is better to treat all forms as potentially poisonous. The toxins in lantana include the triterpene acids, lantadene A (rehmannic acid), lantadene B, and their reduced forms.

Most cases of lantana poisoning occur when new stock are introduced into lantana-infested areas. Stock bred on lantana-infested country avoid lantana unless forced to eat it due to lack of other fodder. Young animals introduced to lantana areas are most at risk.

Symptoms of lantana poisoning depend on the quantity and type of lantana consumed and, under some circumstances, the intensity of light to which the animals are exposed.

Early symptoms of depression are noticeable, with head swaying, loss of appetite, constipation and frequent urination. After a day or two the eyes and the skin of the nose and mouth start yellowing with jaundice, and the muzzle becomes dry and warm. The eyes may become inflamed and have a slight discharge. The animal also becomes increasingly sensitive to light. Finally, the muzzle becomes inflamed, moist and very painful ('pink nose'). Areas of skin may peel and slough off. Death commonly occurs 1–4 weeks after symptoms occur. Death from acute poisoning can occur 3–4 days after eating the plant.

If animals show any of the early symptoms, they should be moved to lantana-free areas, kept in the shade and monitored. Veterinary treatment should be sought immediately. Some remedies may include intravenous fluids, treating skin damage with antibiotics, or drenching with an activated charcoal slurry.

Care should be taken when introducing new or young animals into a paddock if lantana is present. Ensure they have enough fodder to stop them eating lantana in quantities sufficient to result in poisoning. During drought, animals should not be placed in lantana-infested areas without alternative food.

Control

Managing *Lantana camara*

The GBO requires a person to take reasonable and practical steps to minimise the risks posed by *Lantana camara*. This fact sheet provides information and some options for controlling *Lantana camara*.

A general principle is to commence control programs in areas of light infestations and work towards the denser infestations using a mix (integration) of control methods gives the best results. Size, density and geographic location of infestations are important considerations for choosing which mix of control methods to use.

For large lantana infestations, treatment with herbicides by foliar spraying is usually not economically feasible. However, fire, dozing/stick raking, slashing/cutting, aerial helicopter spraying can reduce dense infestations, making follow-up spot treatments with chemicals more economically viable.

Lantana camara seed banks remain viable for at *least* four years, so follow-up control to kill seedlings before they mature is vital to ensure initial management efforts to control the parent bush are not wasted.

Appropriate fire regimes may become part of a management program to ensure *Lantana camara* invasiveness is reduced and pasture is maintained.

Removal of *Lantana camara* within areas of remnant vegetation may require a permit under the *Vegetation Management Act 1999*. Further information should be sought from the Department of Natural Resources and Mines before works commence.

Mechanical control

Stick raking or ploughing can be effective in removing standing plants. However, regrowth from stumps and/or increased seedling germination in disturbed soil is common and the site will require follow-up treatment.

Grubbing of small infestations—for example, along fence lines—can be a useful and effective method of removing plants, although this is time consuming.

Repeated slashing can also reduce the vigour of lantana, exhausting its stored resources and reducing its likelihood of re-shooting.

Some locations—for example, very steep inclines or gullies—are not suitable for mechanical control options because of the danger of overturning machinery and soil erosion.

Fire

Regular burning will reduce the capacity of plants to survive; however, initial kill rates are variable.

The effectiveness of this method will depend on the suitability of available fuel loads, fire intensity, temperature, relative humidity, soil moisture and season.

Pasture re-establishment can then provide competition to inhibit lantana seed germination. Fire is not recommended in non–fire tolerant vegetated areas such as rainforest, or wooded or plantation areas.

A typical control program for fire may include:

- exclude stock to establish a pasture fuel load
- burning (may require a permit)
- sow improved pastures—consult your local Biosecurity Queensland officer for advice
- continue to exclude stock until pasture has established and seeded
- burn again in summer before rain and spot spray *Lantana camara* regrowth when › 0.5 m high and when it is actively growing (see Table 1).

Biological control

Since 1914, 32 biological control agents have been introduced into Australia in an attempt to control lantana. Eighteen have established, of which several insect species cause seasonal damage, reducing the vigour and competitiveness of lantana in some areas.

Biosecurity Queensland research programs continue to investigate agents suitable for release in Australia, and test the viability of these agents in an effort to identify more effective biological control agents.

It is important to remember that biological control alone should not be relied upon for managing lantana infestations. Consideration should be given to other available control techniques.

The four most important biological control agents are:

- **sap-sucking bug (*Teleonemia scrupulosa*)**
  Found in dry areas from Cooktown to Wollongong, this small, mottled, bug feeds on the underside of leaves, growing tips and flower buds, causing the leaves to drop early and stopping the plant from flowering.
- **leaf-mining beetle (*Uroplata girardi*)**
  Found in most lantana infestations from Cape Tribulation to Sydney as well as around Darwin, except in very dry or high altitude areas. The adult beetles are dark brown. They shelter in curled leaves and feed on the upper leaf surfaces. Larvae feed in leaves causing blotches to spread across the leaf. This beetle reduces plant vigour and can suppress flowering.
- **leaf-mining beetle (*Octotoma scabripennis*)**
  Found in most lantana infestations from Atherton to Wollongong. Adults of this species feed on the upper leaf surface, while larvae feed and mine the centre of the leaf and cause blotches. This activity reduces plant vigour and can suppress flowering.
- **seed-feeding fly (*Ophiomyia lantanae*)**
  Found from Cape Tribulation to Eden in New South Wales and also around Darwin and Perth. *Ophiomyia* is a small black fly that feeds on flowers and lays eggs on the green fruits. The maggots of the fly eat the seed and make the fruit unattractive to birds, reducing seed spread.

Other agents such as *Aconophora compressa* (a stem-sucking bug) and *Leptobyrsa decora* (a sap-sucking bug) have caused some damage in specific geographic areas.

Note: Landholders are advised not to consume their time collecting established insects for distribution. Due to their own ability to disperse, these insects will be periodically/seasonally present in areas that are climatically suitable for them.

Herbicide control

Herbicide recommendations for lantana are shown in Table 1. Users of herbicides have a legal obligation to read herbicide labels and use only the registered rates.

Variation in results can be a result of inconsistent application methods, mix rates or seasonal variation. Red-flowered and pink-edged red-flowered lantana are often considered the most difficult to control because their leaves are often smaller and tougher. However, herbicides can kill these varieties if you carefully follow application procedures.

For single-stemmed lantana, basal bark spraying and cut stump methods also give good results at any time of year (but best when the plant is actively growing). On multi-stemmed varieties, you will obtain best results by carefully applying herbicide to each stem.

When treating actively growing plants less than 2 m high, overall spraying of foliage to the point of run-off is recommended. Splatter gun techniques are also effective and particularly useful in hard-to-access areas. This is best done in autumn—when sap flows draw the poison down into the root stock, but before night temperatures get too cold.

Remove grazing animals from spray areas during and soon after treatment. Stress can cause increased sugar levels in the leaves of lantana plants, making them more palatable.

Landholders and contractors should check if the property is situated in a hazardous area. This prevents the use of some herbicides, as defined in the *Agricultural Chemicals Distribution Control Act 1966*.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland on 13 25 23 or visit www.biosecurity.qld.gov.au.

Table 1. Herbicides for control of *Lantana camara*

Situation	Herbicide	Rate	Optimum time[1]	Comments
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights-of-way	Fluroxypyr 200 g/L (e.g. Flagship 200)	500 mL to 1 L/100 L water	October to April	Thorough wetting of plants is required, higher rate should be used for larger plants
	Fluroxypyr 333 g/L (e.g. Starane Advanced)	300–600 mL/100 L water		
	Fluroxypyr 400 g/L (e.g. Comet 400)	250–500 mL/100 L water		
Domestic areas, commerical, industrial and public service areas, agricultural non-crop areas, forests and rights-of-way	Glyphosate 360 g/L (e.g. Roundup Biactive, Glyphosate 360)	1 L/100 L water	October to April	Wet plant thoroughly Glyphosate affects any green plant it comes into contact with Glyphosate is available in a range of strengths Consult labels for rates for other glyphosate formulations
	Glyphosate 450 g/L (e.g. Glyder 450)	800 mL/100 L		
	Glyphosate 540 g/L (e.g. Roundup PowerMax)	660 mL/100 L		
	Glyphosate 700 g/kg (e.g. Macspred Dri 700)	500 g/100 L		
Agricultural non-crop areas, commercial and industrial areas, pastures and rights-of-way	2,4-D 300 g/L + Picloram 75 g/L (e.g. Tordon 75-D)	0.65 L/100 L water	March to May	Thoroughly wet foliage and soil around base of plant Legumes are affected if sprayed
Non-crop and rights-of-way	Dichlorprop 600 g/L (e.g. Lantana 600)	500 mL/100 L water	December to April	Must thoroughly wet all leaves Please refer to product label for situation details
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights-of-way	Triclopyr 300 g/L + Picloram 100 g/L + aminopyralid 8 g/L (e.g. Grazon Extra®)	350 mL to 500 mL/ 100 L water	Summer to autumn	Wet plant thoroughly Use the higher rate on plants over 1 m Legumes may be affected if sprayed
	Triclopyr 300 g/L + Picloram 100 g/L (e.g. Conqueror)			
Pastures, rights-of-way and industrial	2 ,4-D amine 625 g/L (e.g. Ken-Amine 625)	320 mL/100 L water	March to May	Use a coarse spray with sufficient pressure to penetrate canopy and wet stems as well as foliage. Spray at the end of a wet Summer (March to May). Defoliation should occur but respraying of new growth will be necessary in following Autumn. Broadcast grass seed and keep stock off following Summer to allow the pasture to establish. Damage may result to pasture legumes. Red-flowered lantanas are more resistant to 2,4-D
	2 ,4-D amine 700 g/L (e.g. Amicide Advance 700)	285 mL/100 L water Consult label for other formulations of 2,4-D		
Native pastures, rights-of-way, commercial and industrial areas	Metsulfuron-methyl 600 g/kg (e.g. Associate, Lynx® 600)	10 g/100 L water plus wetter	March to May	Plants up to 2 m tall Thoroughly wet all foliage and stems Spray should penetrate throughout the bush Addition of a wetting agent e.g. Pulse is recommended Results variable Not found effective in tropics Follow-up sprays are necessary
Native pastures, rights-of-way, commercial and industrial areas	Glyphosate 360 g/L (e.g. Weedmaster Duo, Glyphosate 360) plus Metsulfuron-methyl 600 g/L (e.g. Associate, Ken-Met 600) + tank mix	400 mL glyphosate 360 + 3 g metsulfuron/ 100 L water	March to May	Apply to actively growing bushes up to 2 m tall Spray to thoroughly wet all foliage and stems Spray to penetrate throughout the bush Do not apply during periods of summer drought stress Addition of a wetting agent e.g. Pulse is recommended
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights-of-way	Fluroxypyr 140 g/L + Aminopyralid 10 g/L (e.g. Hotshot)	500–700 mL /100 L water/100 L water	October to April	Apply to actively growing plants. Spray all foliage, including stems, to the point of run-off. Use the lower rate on seedlings and regrowth 0.5–1.2 m tall and the higher rate on plants 1.2–2 m tall
	(i) Basal bark **(ii) Cut stump**			
	Triclopyr 600 g/L (e.g. Garlon 600)	1 L/60 L diesel	Any time Best results when actively growing	(i) Apply to lower 40 cm of every stem Must ensure complete coverage around stem (ii) Cut close to ground level Immediately apply herbicide
	Triclopyr 240 g/L + Picloram 120 g/L (e.g. Access)			
	Picloram 44.7 g.L + Aminopyralid 4.47 g/L (e.g. Vigilant II® Herbicide Gel)	3–5 mm gel		(ii) If diameter of stump is › 20 mm, use a minimum of 5 mm gel thickness

Table 1. Herbicides for control of *Lantana camara* (continued)

Situation	Herbicide	Rate	Optimum time[1]	Comments
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights-of-way	Glyphosate 360 g/L (e.g. Roundup, Weedmaster Duo)	Undiluted	Any time Best results when actively growing	APVMA permit PER11463 (expires 30/06/2018) Prior to using the herbicides listed under PER11463 you must read or have read to you and understand the conditions of the permit To obtain a copy of this permit visit www.apvma.gov.au
	Splatter gun			
	Glyphosate 360 g/L (e.g. Weedmaster Duo, Glyphosate 360)	1:9 glyphosate + water	October to April	2 x 2 mL dose per 0.5 m height of lantana Addition of Pulse Penetrant may improve control
	Metsulfuron methyl 600 g/L (Associate, Lynx® 600)	2 g/L water	March to May	
	Aerial			Follow label directions for equipment and other requirements for aerial application
Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights-of-way	Triclopyr 300 g/L+ Picloram 100 g/L (e.g. Conqueror) or Triclopyr 300 g/L + Picloram 100 g/L + Aminopyralid 8 g/L (Grazon Extra)	10 L/ha	When actively growing	Helicopter only Minimum of 200 L water per ha Follow-up re-spray will be required Do not burn within six months of treatment
	Triclopyr 300 g/L + Picloram 100 g/L (e.g. Conqueror) or Triclopyr 300 g/L + Picloram 100 g/L + Aminopyralid 8 g/L (Grazon Extra) + 2,4-D amine 625 g/L (e.g. Ken-Amine 625)	1.5 L + 6 L 2,4-D /ha	When actively growing	Helicopter only Minimum of 200 L water per ha Follow-up re-spray will be required Do not burn within six months of treatment
Non-crop and rights-of-way	Dichlorprop 600 g/L (e.g. Lantana 600)	6–8 L/ha	When plant actively growing	

[1]Optimum times are only a guide. *Lantana camara* must be actively growing for the herbicide to work.
Labels often recommend the additional use of a wetting agent or surfactant within the mix. Herbicides types vary in their selectivity against other species and soil residual.

Read the label carefully before use and always use the herbicide in accordance with the directions on the label.

This fact sheet is developed with funding support from the Land Protection Fund.

Department of Agriculture and Fisheries
Biosecurity Queensland

Restricted invasive plant

Singapore daisy

Sphagneticola trilobata

Singapore daisy is a mat forming ground cover. It spreads rapidly and smothers seedling, ferns and shrubs and will out-compete them for survival. Singapore daisy is invading all different environmental areas, even living in sand. Singapore daisy will even grow through lawns if uncontrolled.

Legal requirements

Singapore daisy is a restricted invasive plant under the *Biosecurity Act 2014*. It must not be given away, sold, or released into the environment without a permit. The Act requires everyone to take all reasonable and practical steps to minimise the risks associated with invasive plants and animals under their control. This is called a general biosecurity obligation (GBO). This fact sheet gives examples of how you can meet your GBO.

At a local level, each local government must have a biosecurity plan that covers invasive plants and animals in its area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws. Contact your local government for more information.

Queensland Government

Description

Singapore daisy is a vigorous ground cover or low climbing plant. The leaves are lush glossy green, usually 3 lobed and in pairs up the stem 4–18 cm long and 1.5–8 cm wide.

Singapore daisy produces yellow to orange-yellow daisy flowers about 2 cm. The flowers are held above the leaves on short leaf stalks. Seeds are elongated, brown 4–5 mm long. The amount of seed per flowers varies greatly.

Life cycle

Flowers mostly spring to autumn but will flower all year round. Most reproduction is vegetative, from stems nodes.

Methods of spread

Singapore daisy produces variable amounts of seeds but is mainly spread by cuttings via slashing and pruning.

Habitat and distribution

Singapore daisy is a garden escapee and native of tropical America. It prefers moist areas on a range of soil types. Found in gardens, parks, bushland, disturbed areas, along roadsides, lawns and footpaths.

It is becoming a problem by invading wetlands, irrigated areas and around drains.

Present in all coastal areas of Queensland.

Control

Managing Singapore daisy

The GBO requires a person to take reasonable and practical steps to minimise the risks posed by Singapore daisy. This fact sheet provides information and some options for controlling Singapore daisy.

As Singapore daisy likes to establish in disturbed areas, pre plan revegetation of the area you are clearing. Take extra care when mowing or slashing around areas planted where Singapore daisy is planted so small fragments are not spread to other locations.

Physical control

Hand pull and dig up runners. The plant will regrow from the smallest cutting so dispose of waste carefully. Either burn waste or put into a black plastic bag and place in the sun for a few days before putting into the refuse bin. Repeat hand pulling will need to be done as new lawns.

Herbicide control

An off-label use permit allows the use of various herbicides for the control of Singapore daisy in non-agricultural areas, bushland and forests.

See Table 1 for treatment options allowed by the permit.

Prior to using the herbicides listed under PER11463 you must read or have read to you and understand the conditions of the permit. To obtain a copy of this permit visit www.apvma.gov.au.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland on 13 25 23 or visit www.biosecurity.qld.gov.au.

Table 1. Herbicides for control of Singapre daisy

Situation	Herbicide	Rate	Registration status	Comments
Native pastures, rights-of-way, commercial and industrial areas	Metsulfuron-methyl 600 g/L (e.g. Nufarm Associate)	10 g per 100 L water plus wetting agent	APVMA PER11463 (permit expires 30/06/2018)	Spray thoroughly to wet all foliage, but not to cause run-off Minimise contact with desirable species Only use products registered for Singapore daisy

Read the label carefully before use. Always use the herbicide in accordance with the directions on the label.

This fact sheet is developed with funding support from the Land Protection Fund.

Appendix B Threatened Flora Profiles known within the site

Diuris oporina (northern white donkeys tail)	
EPBC Act Status	-
NC Act Status	NT
Species Description[1]	The species is a deciduous, geophytic herb, growing up to 50 cm in height. Plants are erect, with 1 to 3 linear green leaves up to 25 cm in length. Flowers number one to 10 per plant, are mauve to purple, often with darker purplish blotches, and yellow at the base of the labellum. Lateral sepals are greenish brown, narrow and up to 60 cm in length.
Habitat Description	The species is known from *Corymbia leichhardtii* and *Eucalyptus crebra* open woodland over with a ground layer dominated by native grasses on rhyolitic hills (*Australian Virtual Herbarium*, 2020). Within the site the species has been recorded within REs: • 7.12.27c • 7.12.30a • 9.12.30a

Source: E2M 2019

[1] The Species description has been directly adapted from the description provided in the *Diuris puncatata var. punctata* Flora and Fauna Guarantee Act 1988 Action Statement (Department of Sustainability and Environment, 2004)

Plectranthus amoenus	
EPBC Act Status	-
NC Act Status	V
Species Description[2]	• Habit: Sparse open growing semi-succulent shrub with grey stout ascending stems • Leaves: thick and fleshy and covered with dense, pale hairs, with felt like texture. They are broad and have prominent raised veins. Leaves are aromatic when crushed. The veins are readily visible on both sides of the leaf and strongly raised on the lower surface. • Flowers: about 10cm long, blue to purple and arise from terminal stalk held above main stems. • Fruits: small, dry and papery capsule.
Habitat Description	The species occurs on granite rock outcrops and pavements within open forests dominated by *Syncarpia glomulifera* and *Eucalyptus resinifera* within the Atherton Tablelands (Forster, 1997). Within the site the species is known from a single location within open woodland on rocky hillslopes of *Corymbia citriodora* (lemon-scented gum) with emergent *Eucalyptus cullenii* (Cullen's ironbark). The subcanopy (T2) comprised *Corymbia leichhardtii* (yellowjacket), *Allocasuarina inophloia* (woolly oak), *Bursaria incana* (mock orange) and *Acacia sp.* (AECOM, 2017).


Source: E2M 2019

[2] The species description has been directly adapted from the species descriptions presented in Mount Emerald Mountain Threatened Plants Management Plan (RPS Australia, 2016)

Appendix C Rehabilitation Species Pallets

Table 16 Rehabilitation species pallets

RE	Canopy Layer#	Shrub / Sub-canopy Layer#	Ground Layer#
7.8.7a	*Eucalyptus tereticornis*^ *Corymbia intermedia* *Eucalyptus drepanophylla*	*Lophostemon suaveolens*^ *Acacia flavescens*	*Themeda triandra*^ *Alloteropsis semialata*^ *Heteropogon contortus* *Chrysopogon fallax*
7.8.8b	*Eucalyptus reducta*^ *Corymbia intermedia* *Corymbia citriodora* *Eucalyptus drepanophylla*	*Allocasuarina littoralis*^ *Acacia flavescens*^ *Breynia oblongifolia* *Wikstroemia indica*	*Themeda triandra*^ *Alloteropsis semialata*^ *Heteropogon contortus* *Capillipedium spicigerum*
7.12.27a	*Eucalyptus reducta*^ *Corymbia citriodora* *Eucalyptus tereticornis*	*Allocasuarina littoralis*^ *Hakea benthamii* *Breynia oblongifolia* *Lophostemon suaveolens*	*Themeda triandra*^ *Alloteropsis semialata*^ *Heteropogon contortus* *Chionachne cyathopoda*
7.12.27c	*Eucalyptus resinifera*^ *Syncarpia glomulifera* *Corymbia clarksoniana*	*Allocasuarina littoralis*^ *Hakea benthamii* *Gastrolobium grandiflorum*	*Themeda triandra*^ *Alloteropsis semialata*^ *Cymbopogon refractus* *Imperata cylindrica*
7.12.30a	*Corymbia citriodora*^ *Eucalyptus portuensis*	*Allocasuarina littoralis*^ *Acacia calyculata*^ *Grevillea parallela* *Platysace valida* *Jacksonia thesioides* *Persoonia falcata* *Breynia oblongifolia*	*Themeda triandra*^ *Alloteropsis semialata*^ *Panicum simile* *Chrysopogon fallax* *Chionachne cyathopoda*
7.12.34	*Eucalyptus portuensis*^ *Eucalyptus drepanophylla*^ *Corymbia intermedia*	*Allocasuarina littoralis*^ *Acacia flavescens* *Lophostemon suaveolens* *Breynia oblongifolia*	*Themeda triandra*^ *Alloteropsis semialata*^ *Setaria surgens* *Chionachne cyathopoda*
7.12.60a	*Melaleuca viridiflora*^ *Corymbia peltata* *Eucalyptus portuensis* *Eucalyptus shirleyi*	*Allocasuarina littoralis*^ *Hakea benthamii*	*Eriachne mucronata*^ *Chrysopogon fallax*^ *Themeda triandra* *Alloteropsis semialata*^
9.12.4	*Eucalyptus shirleyi*^ *Corymbia peltata*	*Allocasuarina littoralis*^ *Persoonia falcata* *Acacia leptostachya* *Petalostigma banksii*	*Themeda triandra*^ *Setaria surgens*^ *Chrysopogon fallax* *Alloteropsis semialata* *Panicum simile*

RE	Canopy Layer#	Shrub / Sub-canopy Layer#	Ground Layer#
9.12.30a	*Corymbia leichhardtii*^ *Eucalyptus portuensis* *Corymbia citriodora* *Corymbia intermedia*	*Acacia calyculata*^ *Hakea benthamii*^ *Pultenaea millarii*^ *Allocasuarina inophloia* *Jacksonia thesioides* *Platysace valida* *Acacia nesophila* *Cryptandra debilis*	*Themeda triandra*^ *Alloteropsis semialata*^ *Heteropogon triticeus* *Chrysopogon fallax* *Panicum simile*

= Species presented in order of dominance

^ = Dominant species within community to be preferentially utilised for rehabilitation.

Appendix D 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-risk 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

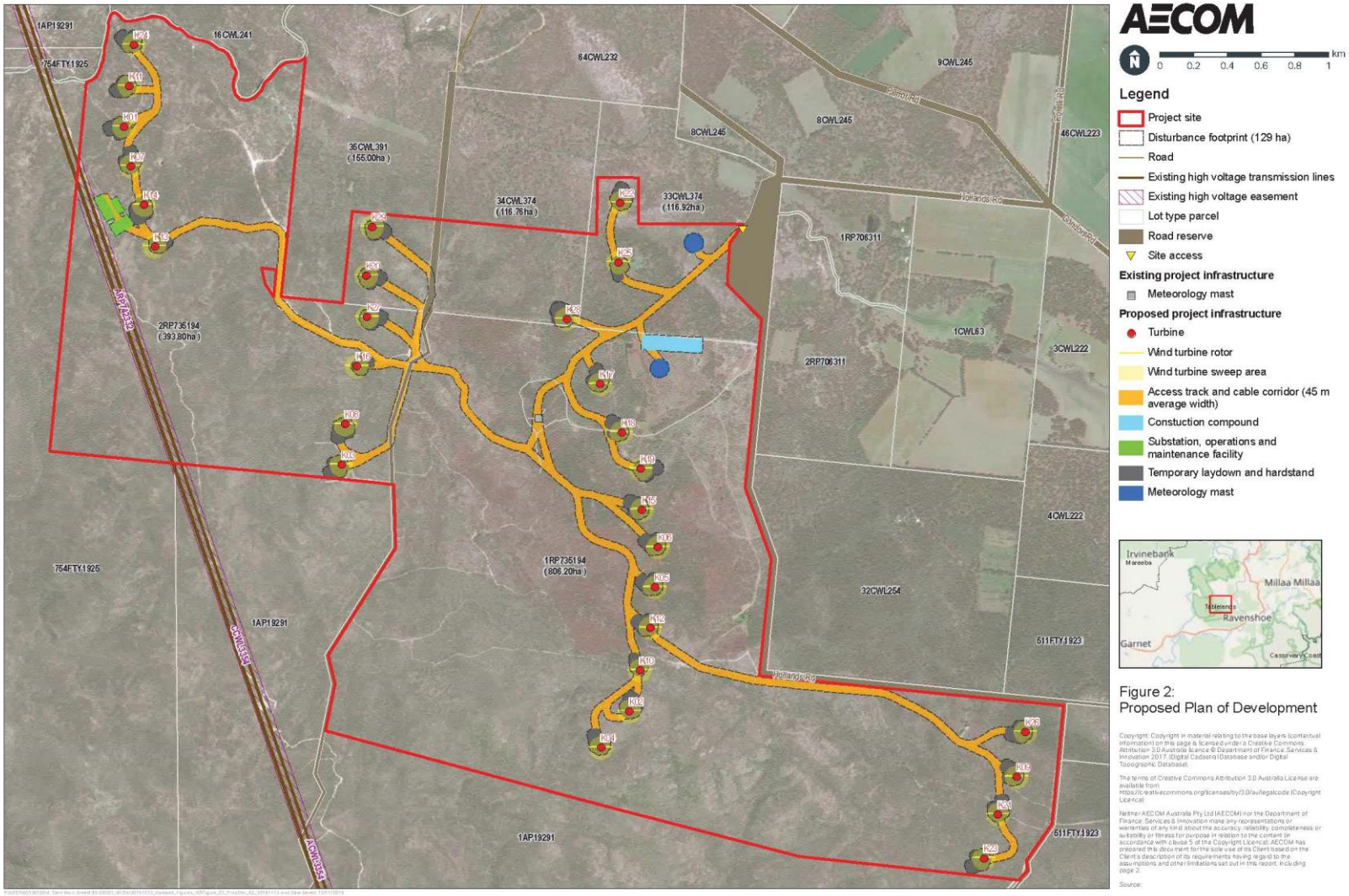


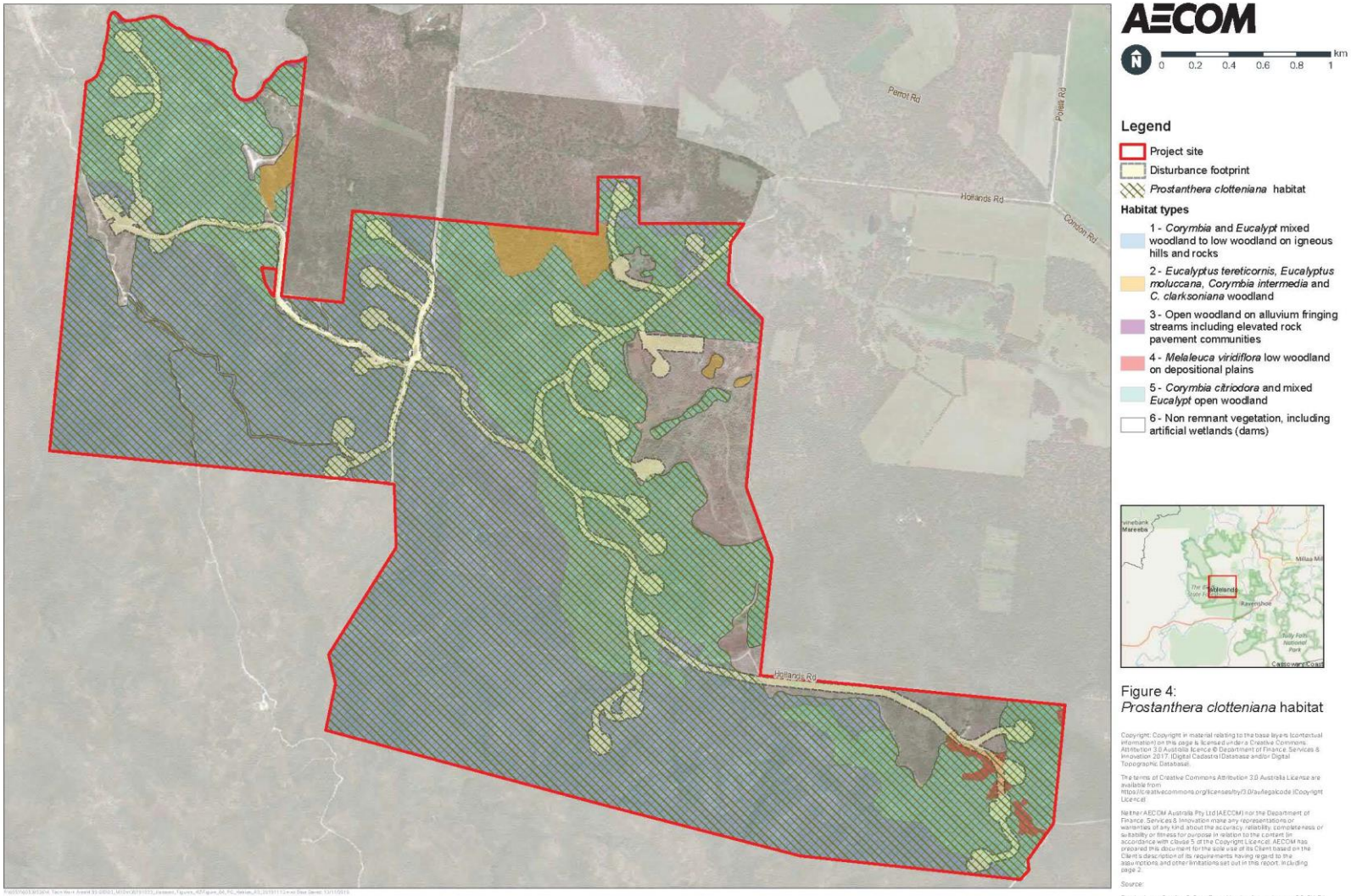
Figure 2:
Proposed Plan of Development

Source:

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

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

Appendix B: Prostanthera habitat



AECOM

N 0 0.2 0.4 0.6 0.8 1 km

Legend

- Project site
- Disturbance footprint
- *Prostanthera clotteniana* 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 4:
Prostanthera clotteniana habitat

Source:

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

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

Appendix C: Magnificent Brood Frog habitat

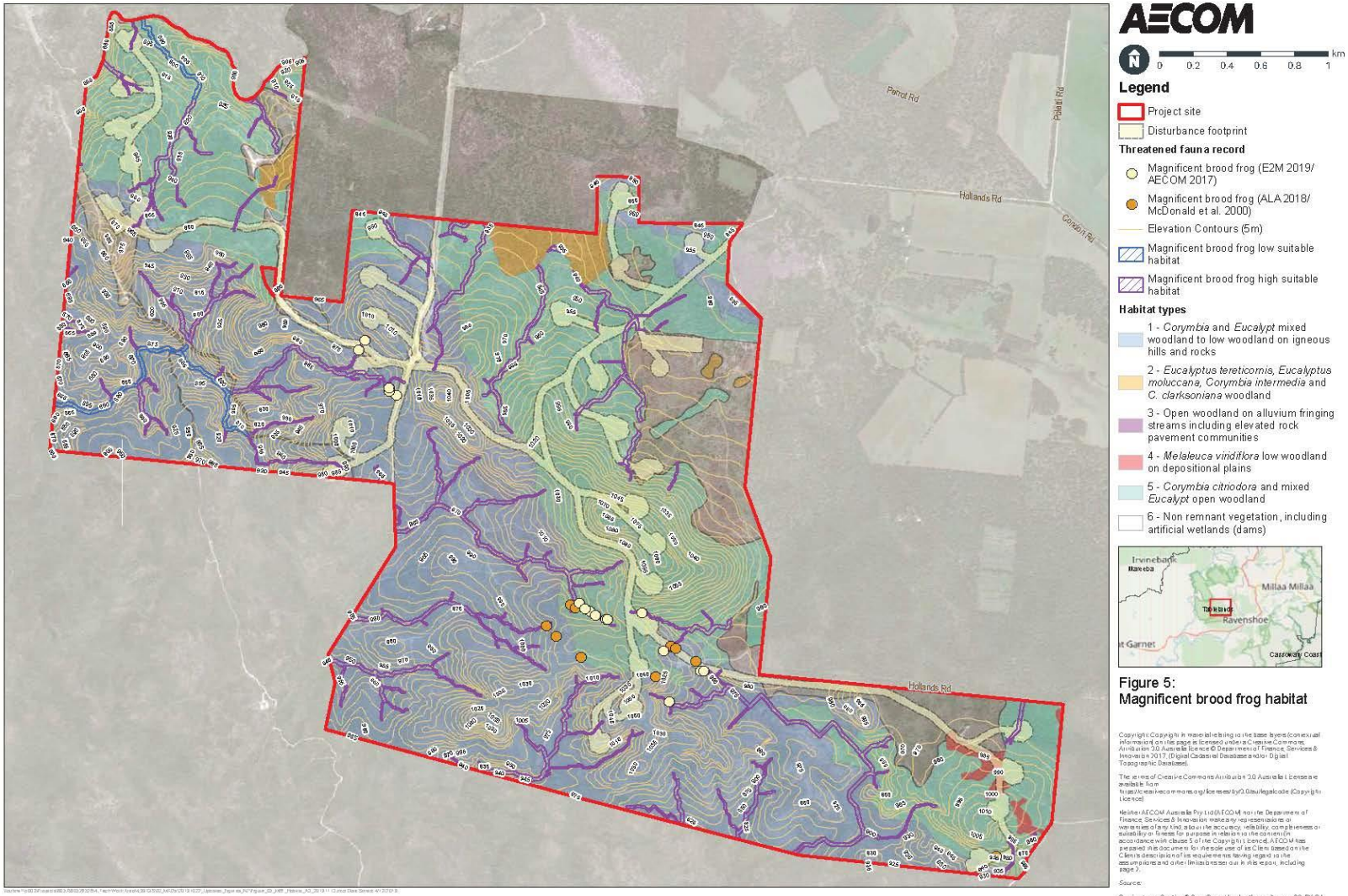
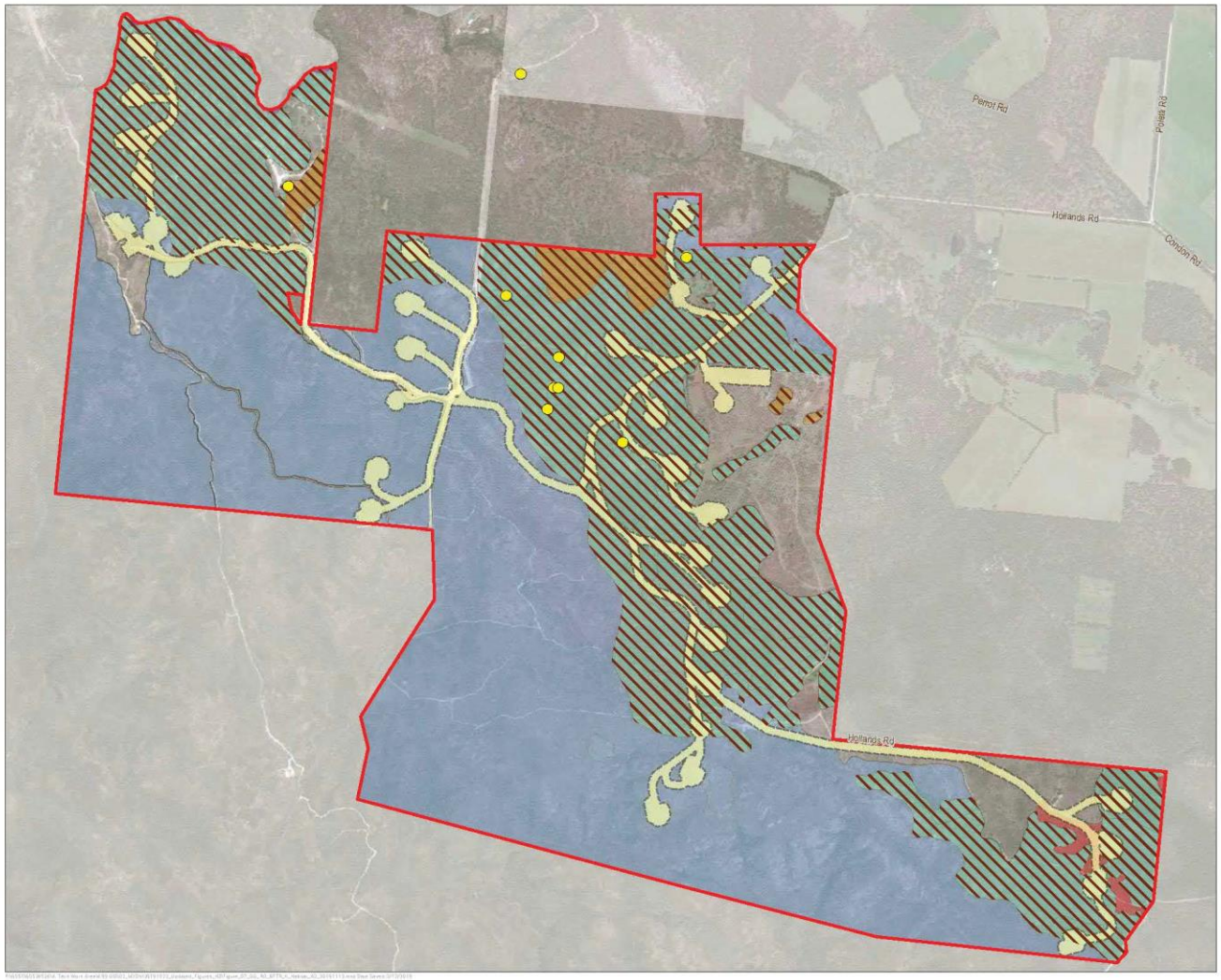


Figure 5:
Magnificent brood frog habitat

Appendix D: Greater Glider habitat



AECOM

N 0 0.2 0.4 0.6 0.8 1 km

Legend

- Project site
- Disturbance footprint
- Greater glider, red goshawk and black footed tree-rat

Threatened fauna record

- Greater glider (E2M 2019/ AECOM 2017)

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

Source:

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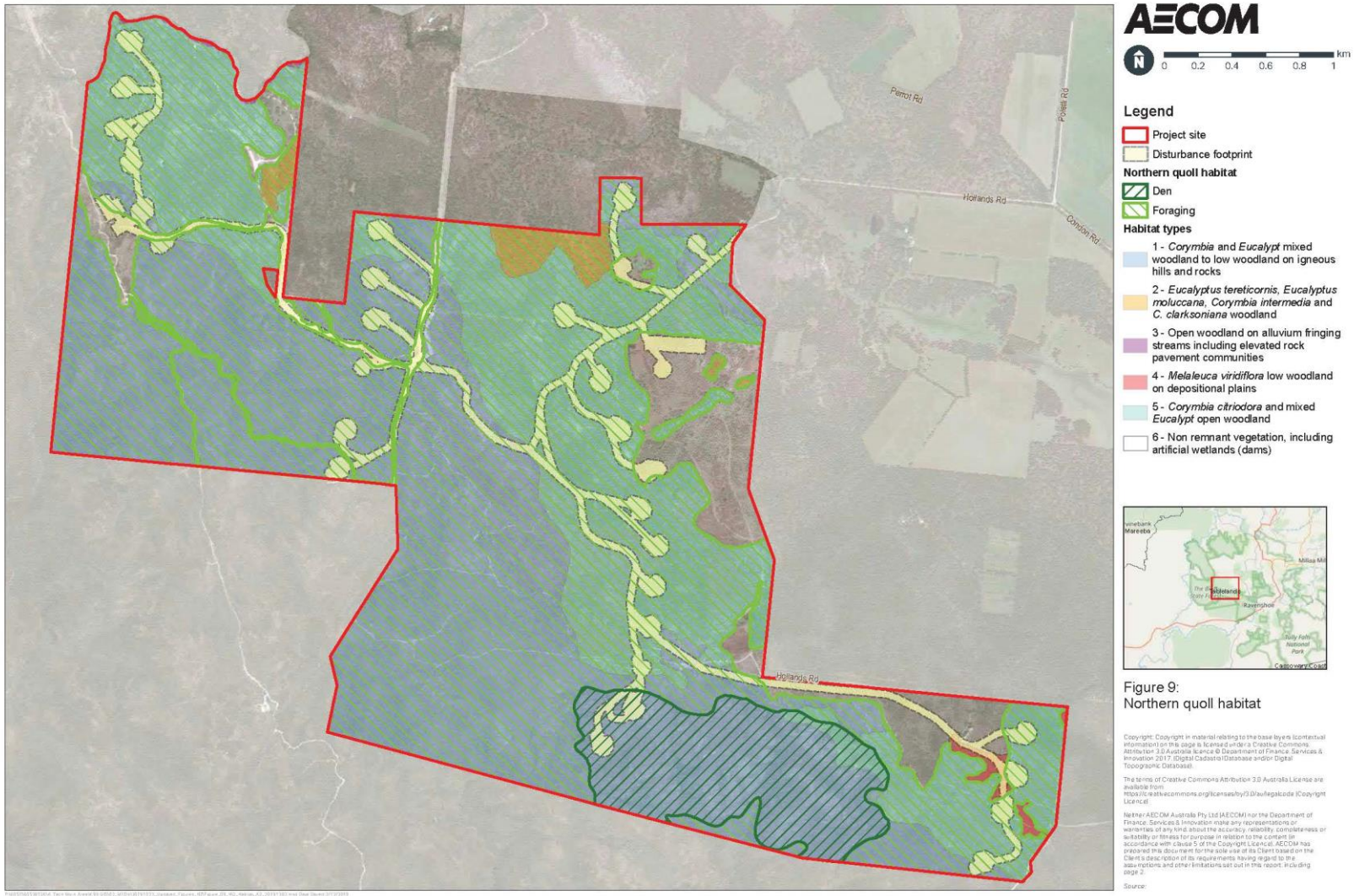
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

Appendix E: Northern Quoll habitat and Northern Quoll denning habitat



Source:

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